THE

MARINE BIOLOGICAL STATION AT PORT ERIN

(Isle of Man),

BEING THE

TWENTY-FIRST ANNUAL REPORT

OF THE

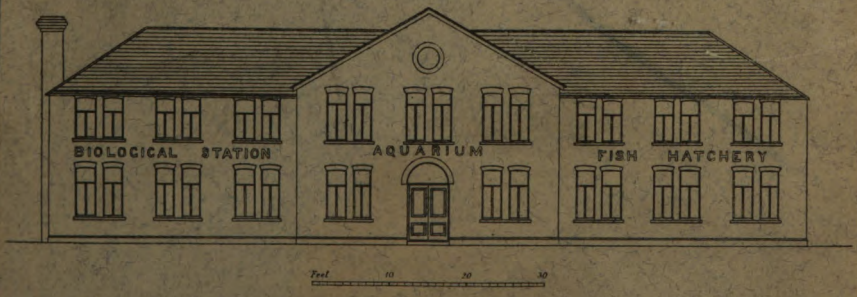
LIVERPOOL MARINE BIOLOGY COMMITTEE.

BY

W. A. HERDMAN, D.Sc., F.R.S.,

PRESIDENT OF THE LINNEAN SOCIETY OF LONDON AND GENERAL SECRETARY OF THE BRITISH ASSOCIATION;
DERBY PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF LIVERPOOL;
CHAIRMAN OF THE LIVERPOOL MARINE BIOLOGY COMMITTEE,
AND DIRECTOR OF THE PORT ERIN STATION.

[Read, in part, before the Liverpool Biological Society, November 8th, 1907.]



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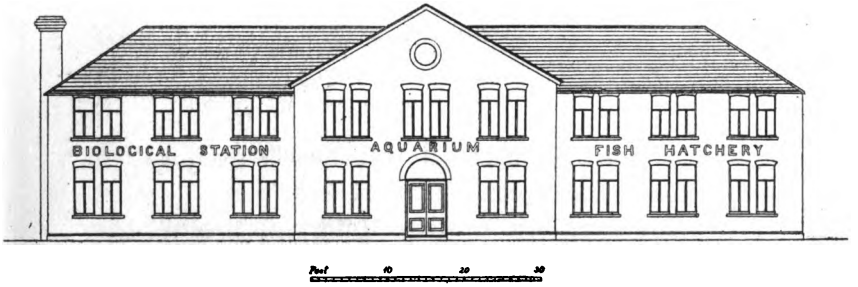

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LIVERPOOL MARINE BIOLOGY COMMITTEE.

THE pages of this Report will, I hope, show that the past year has been unusually full of work at our Biological Station, and especially at sea, where greater activity in submarine exploration has been displayed during the recent Easter and Summer vacations than was possible at

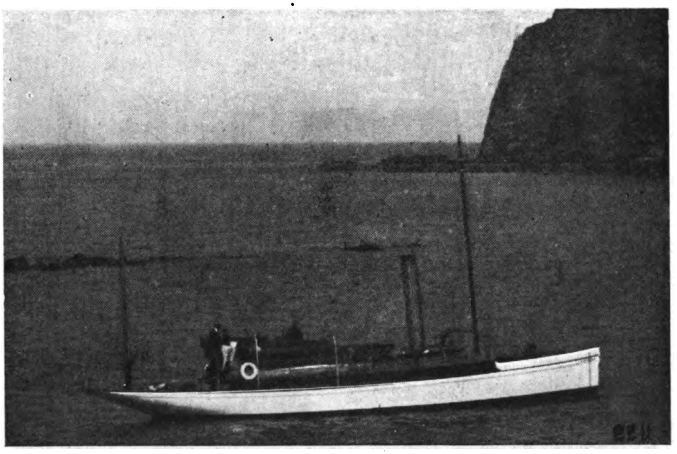

FIG. 1.—S.Y. "Ladybird."—From a Photo by Mr. E. E. UNWIN.

any previous period of our work. As an example, Mr. Andrew Scott, who is examining the tow-nettings, writes to me that over seven hundred samples have already been sent to him from the Irish Sea this season, a great increase on the number in any previous year. This improvement is mainly due to the advantage derived from having my small steam-yacht "Ladybird" available for use in dredging, tow-netting, and taking other observations in the deeper waters outside the bay.

As it is my desire and hope that this boat may contribute much to the scientific exploration of the Irish Sea in the future, it may be useful to readers of our reports that I should put on record here those particulars that give some idea of her size and fitness for work. She is a screw yacht, built of teak, by Summers and Payne, Southampton, in 1900, and measures about 70 feet over all by 12 feet beam and 6 feet draft. The cuts (figs. 1, 2, &c.) will show the fore-deck (with derrick, steam-capstan, and

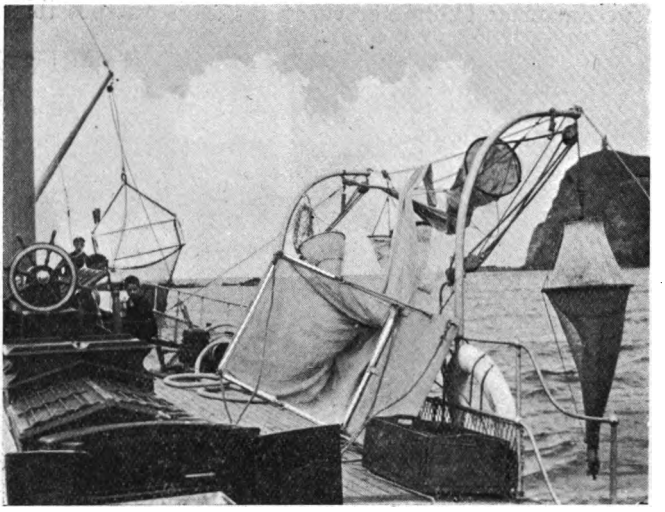

FIG. 2.—Equipment of Plankton Nets, &c., on board the S.Y. "Ladybird." (Photo by Mr. R. OKELL).

reel of 200 fathoms of steel wire rope from which we work the trawl and dredges) and the long counter aft where we haul up the tow-nets and other smaller instruments. The tonnage is 36 (yacht measurement), the horse-power about 55, and the "Ladybird" will steam all day at $8\frac{1}{2}$ to 9 knots on a small consumption of coal. Some of the other illustrations in this Report will show portions of the boat with some of her scientific apparatus in use.

We have worked with her this summer down to 76 fathoms in the deep channel between Port Erin and Ireland, where much exploration still requires to be done.

As on previous occasions, Mr. Chadwick's section appears below under the heading "Curator's Report," but I am, as usual, indebted to him, or to his weekly Reports, for much of the information given under "The Station Record" and elsewhere.

Mr. Chadwick has now completed the tenth year of his service as Curator of the Port Erin Biological Station, and he tells me that during that period 128 individual naturalists and students (some of them, of course, on many different occasions) have worked with him in the institution. I think I may venture to assure Mr. Chadwick, on behalf both of the Committee and also of all these workers, of our high appreciation of the careful and conscientious manner in which he has performed his duties, and of our cordial thanks for his constant helpfulness and cheerfulness, and for his successful endeavours to meet our manifold wants, both in the laboratory and on the shore.

It is a great pleasure to me to be able to congratulate Mr. Chadwick upon the mark of distinction which he has recently received in being elected, on December 19th, to the vacant Associateship of the Linnean Society of London. The A.L.S. is a real honour, and will be regarded by Mr. Chadwick's friends as a well-merited and welcome recognition of his long-continued good work as a naturalist.

The continued success of the Aquarium, and the increase in both the number and the appreciation of the visitors, is again most gratifying. An institution where nearly sixteen thousand summer visitors are shown the most interesting and beautiful of our sea-side animals

and plants in the living condition, amidst natural surroundings, with labels, pictures and other information, must, surely, be doing much to encourage nature-study and to foster an appreciation of biology. Over a thousand copies of the new edition of the illustrated "Guide to the Aquarium" have been sold to visitors during the present summer. This enlarged edition of the "Guide" is a booklet of about 80 pages and over 40 illustrations. Copies, at 3d. each (post free 4½d.), can always be obtained by writing to Mr. Chadwick, at Port Erin.

The Station Record.

Thirty-five naturalists and students have occupied the Laboratories for varying periods during the year, as follows:—

Date.	Name.	Work.
Dec. 26th, 1906, to Jan. 8th, 1907	Prof. Herdman	Official.
Dec. 26th, 1906, to Jan. 8th, 1907	Dr. H. E. Roaf	Digestive ferments of Invertebrates.
March 25th, to April 26th	Mr. H. J. B. Wollaston	Plankton Statistics.
March 28th to April 29th	Prof. Herdman	Plankton.
April 2nd to April 29th	Mr. R. D. Laurie	Biometry and regeneration in Crustacea.
April 2nd to April 11th	Mr. E. J. Whitnall	General.
April 4th to April 18th	Mr. E. E. Unwin	Photography of marine animals.
April 5th to April 10th	Mr. S. Chaffers	Marine Diatoms.
April 6th to April 27th	Mr. W. J. Dakin	Anatomy and Physiology of Pecten.

Date.	Name.	Work.
April 11th to April 25th	Mr. W. A. Gunn	General.
April 13th to April 29th	Miss E. Bury	General.
	Miss M. Cheetham	
	Miss W. Herdman	
	Miss E. Hirst	
	Miss M. Johnston	
	Miss A. Kenyon	
	Miss G. Mitchell	
	Miss D. Moss	
	Miss A. Nicholls	
	Miss E. Norris	
	Miss A. Owen	
	Mr. Billington	
	Mr. Brown	
	Mr. Crook	
April 15th to April 17th	Dr. A. T. Masterman	Embryology of Solaster.
April 15th to April 29th	Mr. J. Pearson	Anatomy and physiology of Cancer pagurus.
April 13th to April 29th	Prof. B. Moore	Bio-chemistry of Cancer and Pecten.
April 13th to April 18th	Mr. H. Gunnery	Marine Algæ.
May 31st to June 30th	Dr. J. H. O'Connell	Actiniaria.
June 14th to July 25th	Mr. F. H. Gravely	Embryology of Echinoderma and Polychæta.
June 25th to July 18th	Mr. H. Hawkins	Echinoderma.
June 24th to July 5th	Mr. G. A. Dunlop	General.
August 1st to August 23rd	Miss Newton	Polychæta and Polyzoa.
August 1st to August 23rd	Miss Galloway	Polychæta and Polyzoa.
August 3rd to August 24th	Mr. W. Fries	Hydroida and Polychæta.

DATE.	NAME.	WORK.
August 9th to Sept. 23rd	Prof. Herdman	Plankton.
August 9th to Sept 26th	Mr. H. J. Buchanan Wollaston	Plankton.
August 19th to August 31st	Mr. J. Davidson	General.
August 31st to Sept. 21st	Dr. H. E. Roaf Miss Herdman	Digestive ferments of Invertebrates.

The "Tables" in the Laboratory were occupied as follows:—

Liverpool University Table:—

Professor Herdman.	Prof. B. Moore.
Dr. Roaf.	Mr. H. J. Buchanan Wollaston.
Mr. R. D. Laurie.	Miss Herdman.
Mr. W. J. Dakin, B.Sc.	Mr. J. Davidson.
Mr. J. Pearson, M.Sc.	Miss W. Herdman.
Mr. W. A. Gunn.	

Liverpool Marine Biology Committee Table:—

Dr. A. T. Masterman.	Mr. E. E. Unwin.
Dr. J. H. O'Connell.	Mr. H. Gunnery.
Mr. W. Fries.	Mr. Dunlop.

Manchester University Table:—

Mr. E. J. Whitnall.	Mr. F. H. Gravely.
Mr. S. Chaffers.	Mr. H. Hawkins.

Birmingham University Table:—

Miss Newton.	Miss Galloway.

The following students of Liverpool University occupied the Junior Laboratory, and worked together under the supervision of Professor Herdman, Mr. Pearson and Mr. Laurie:—

Miss E. Bury.	Miss E. Norris.
Miss M. Cheetham.	Miss A. Owen.
Miss E. Hirst.	Miss A. Nicholls.
Miss A. Kenyon.	Mr. Billington.
Miss M. Johnston.	Mr. Brown.
Miss G. Mitchell.	Mr. Crook.
Miss D. Moss.	

In addition, Mr. Robert Okell, F.L.S., Secretary to the Manx Fishery Board, paid frequent official visits to the Biological Station.

The Laboratory was also inspected during the year by Professor Hickson, F.R.S. (Manchester), Mr. Stanley Gardiner (Cambridge), Professors Heincke and Ehrenbaum, of the Heligoland Biological Station; Dr. A. T. Masterman, H.M. Inspector of Fisheries; Mr. J. G. Legge, Director of Education in Liverpool; Dr. J. Travis Jenkins, Superintendent of the Lancashire and Western Sea-Fisheries; and other naturalists and officials.

Curator's Report.

I take the following paragraphs almost verbatim from the detailed report furnished to me by Mr. H. C. Chadwick:—

"The work of the past year has been characterised by gratifying progress in every department except that of the fish hatchery, where, owing to various causes, the number of plaice larvæ hatched was considerably below that of last year. The number of students who have occupied the laboratories shows a marked increase, and though original researches have not figured quite so largely as last year, much good work has been done. During the Christmas vacation, at Easter, and again in September, Dr. Roaf continued his researches on the digestive ferments of Invertebrates, and upon the secretion of the hypobranchial glands of Mollusca, and, during the latter period, began an inquiry into the physiological condition of what are known to local fishermen as "granny" edible crabs. During the Easter vacation, Professor B. Moore devoted some time to the bio-chemistry of the blood and other tissues of *Pecten*. Mr. Pearson and Mr. Dakin continued their work on the edible crab (*Cancer*) and *Pecten* respectively, and Mr. Laurie instituted some experiments on regeneration of lost parts in the higher Crustacea. On the faunistic

side excellent work was done by Dr. O'Connell, who, in addition to extending our knowledge of the distribution of species of Actiniaria already known, added the name of at least one species to the local fauna. During a stay of over five weeks, Mr. F. H. Gravely devoted much attention to the plankton fauna of the bay, and laid future workers under an obligation by identifying a number of larval forms. Amongst other interesting features of the faunistic work of the year may be mentioned the discovery by Dr. O'Connell and Mr. Gravely of the Lucernarian *Haliclystus auricula* at Fleshwick, where large numbers were found adhering to the fronds of the alga *Alaria esculenta* on the North side of the bay. The colour of the Lucernarian so nearly resembled that of the alga that a little practice of the eye was necessary to enable the collector to detect the animals. Dr. O'Connell found several colour varieties of *Corynactis viridis* abundant in the rock pools under Bradda Head, and added *Sagartia rosea* from the Calf Sound to our list of local anemones. To the same list Professor Herdman added *Bunodes thallia* and *Stomphia churchiæ* from a bank about eight miles off Ballaugh, and the beautiful little coral *Paracyathus pteropus*, Gosse, from the Train Bank off Port Erin. All these rare species are now to be seen alive in our Aquarium.

"Tow-nettings have been taken in the bay more frequently throughout this year than for several years past, and much of the time I have been able to spare for shore work has been devoted to the collection of the various marine animals required for research purposes. During the months of August and September, nearly the whole of my time was devoted to the identification and preservation of the specimens dredged by Professor Herdman from his steam-yacht "Ladybird," and to the

supervision of the lobster hatching and rearing carried on in the fish hatchery.

"A few additions have been made to the Library by purchase and exchange, and have added materially to its usefulness."

The Aquarium.

"In spite of an exceptionally rainy season, the Aquarium has more than maintained its recognised position amongst the chief attractions of the neighbourhood, over 15,500 visitors having paid for admission. Of this number nearly 10,000 came in July and August, and in the latter month 553 were admitted on one day. Not without some difficulty during the busy months of the spring and late summer the tanks have been maintained in good condition by the Assistant Curator. The only addition to the fishes exhibited therein is the haddock, the exceptional abundance of which in the neighbourhood enabled us to secure a supply. The table tanks now contain a really fine collection of anemones, as regards both individuals and species, including the rarer forms, *Aureliana augusta*, *Sagartia herdmani*, *Bunodes thallia*, and *Stomphia churchiæ*. Over one thousand copies of the "Guide to the Aquarium" have been sold, and the applications for copies I have had from people at a distance show that its usefulness is by no means confined to our own institution."

The Fish Hatchery.

"Our work in the Fish Hatchery has not been quite so successful this year as last. The hatching season was throughout marked by a high percentage of unfertilised eggs, and the total number spawned was considerably smaller than that of last year. Otherwise the work progressed normally, and 3,460,500 larval plaice were liberated between March 21st and May 10th inclusive,

chiefly from Professor Herdman's steam-yacht "Lady-bird." The majority of the adult fish which furnished the eggs had been retained in the pond from the previous season, and to these 119 were added by means of trammel nets worked by the Assistant Curator in the bay.

"The approximate numbers of the eggs collected and of the young fish set free upon the dates specified are given in the following table:—

Eggs collected.		Date.		Larvæ set free.		Date.	
26,000	...	Feb.	25	19,000	...	Mar.	21
29,000	...	,,	27	25,000	...	,,	21
18,500	...	Mar.	1	12,000	...	,,	21
82,000	...	,,	4	68,000	...	,,	26
69,000	...	,,	6	50,000	...	,,	26
76,000	...	,,	7	70,000	...	,,	28
47,000	...	,,	9	42,000	...	,,	28
43,500	...	,,	11	40,000	...	April	1
83,000	...	,,	12	77,000	...	,,	1
43,000	...	,,	14	32,500	...	,,	1
100,000	...	,,	15	50,000	...	,,	1
111,000	...	,,	19	85,000	...	,,	4
168,000	...	,,	21	140,000	...	,,	8
160,000	...	,,	23	140,000	...	,,	9
229,000	...	,,	25	198,000	...	,,	11
315,000	...	,,	27	211,000	...	,,	13
105,000	...	,,	28	84,000	...	,,	15
395,000	...	,,	30	355,000	...	,,	16
336,000	...	April	1	281,000	...	,,	19
194,000	...	,,	2	131,000	...	,,	22
304,500	...	,,	4	368,500	...	,,	23
284,000	...	,,	6				
250,000	...	,,	8	200,000	...	,,	25
231,000	...	,,	9	158,000	...	,,	27
143,000	...	,,	11	120,000	...	May	4
131,000	...	,,	13	91,000	...	,,	6
138,000	...	,,	15	80,000	...	,,	6
178,500	...	,,	16	123,500	...	,,	6
132,000	...	,,	18	59,000	...	,,	6
79,000	...	,,	20	49,000	...	,,	6
61,000	...	,,	22	46,000	...	,,	6
16,000	...	,,	24	11,000	...	,,	10
84,000	...	,,	25	44,000	...	,,	10
4,662,000				3,460,500			

"The smaller, or western, pond was drained on May 15th, in preparation for further experiments in lobster culture, and we then found between 300 and 400 young plaice which had been hatched on April 25th, 1906, and were thus just over a year old. I carefully measured 300 of these fish, and found the largest to be $5\frac{3}{8}$ inches in length, and the smallest $1\frac{7}{8}$ inches, the mean length being $2\frac{3}{4}$ inches. All these young fish appeared to be in a perfectly healthy condition, and seemed well nourished for their size. They must have subsisted entirely upon the minute floating organisms in the water of the pond. The wide range in size, considering that they were all of exactly the same age, is noteworthy. Several of them afforded excellent examples of bi-colouration, pigment being present on both sides of the body, and only a small portion of the anterior end of the usually unpigmented lower side being normal in colour."

Lobster Culture.

"During the months of May and June twenty 'berried' female lobsters were purchased from the local fishermen and placed in the western pond. Large stones were arranged so as to afford hiding-places for them, and they were regularly fed with pieces of fresh fish. This was done in order to find out whether the conditions were favourable to the retention of the eggs on the swimmerets of the parent lobster until they were ready for hatching. On July 18th the pond was again drained, and it was found that while some of the lobsters had stripped themselves of their eggs, others had retained them, and that the retained eggs were beginning to hatch out. It was also found that the bottom of the pond was covered with a luxuriant growth of a green filamentous alga, and that the eggs of the lobsters were involved in it. As it

appeared probable that the larvæ would also become entangled and eventually perish, I decided on the following day to remove the parent lobsters to the hatching tanks indoors. They were accordingly placed one in each of the middle compartments of the tanks, and hatching boxes were placed in the lowest compartments in order to retain the newly-hatched larvæ. Other boxes were placed in the uppermost compartments in view of rearing the larvæ. Early in August several 'berried' lobsters with nearly-ripe eggs were brought in by fishermen and were added to our stock. I am unable to say with any approach to accuracy how many larvæ were hatched, but 2,550 in the first and second stages, and 80 in the 'lobsterling' stage were set free in the sea as follows:—

Date.		Stage.	No.
July	22nd	First	500
,,	24th	First	500
,,	26th	First	500
,,	29th	Second	300
August	5th	Second	350
,,	23rd	First	300
September	2nd	Second	100
,,	2nd	Lobsterling	7
,,	11th	,,	12
,,	19th	,,	31
,,	25th	,,	20
October	4th	,,	10
		Total	2630

A number of the larvæ in the early stages, and all the lobsterlings, were set free inside the ruined landing pier at the base of the breakwater, where there is abundance of shelter from predaceous fishes and where young lobsters are known to occur. Of the remaining young larvæ a number were liberated, from the S.Y. 'Ladybird,' along the northern side of the Calf

Island, where the Port Erin fishermen set their traps, and the remainder off Spanish Head, where the Port St. Mary men fish."

Mr. F. H. Gravely, Demonstrator of Zoology in the University of Manchester, who occupied the Work-Table of that University during the greater part of June and July, 1907, has sent me the following note upon some of the observations made in the course of his work.

Mr. Gravely's Report.

"The following finds appear to be worthy of note:—

Hydrozoa.

Syncoryne eximia.—Only once recorded before, and then from the dredge ("Fauna," Vol. IV., p. 279), and once, I believe, found by Mr. Dakin in water from his laboratory tap at Easter. This summer it occurred in sheets over the vertical and overhanging faces of the blocks on the W. side of the breakwater at and below low water level; it was also obtained from rock pools at Port St. Mary, the Calf Sound (both sides), and in the little bay by the caves just round the angle of the cliffs by the Castle Rocks. Mr. Chadwick has since found it in quantity covering the cork floats attached to a number of crab-pots.

Garveia nutans.—No published record from the Isle of Man as yet, I think. I found this in a deep rock pool above low-water mark on the Port Erin side of the Calf Sound.

Tubularia indivisa var. *obliqua.*—This form occurred on an overhanging ledge of rock just above low water mark at Port St. Mary. It is characterised by a single large (0·2 × 0·1 mm.) tentacle covering the umbrella-mouth of each female gonophore and capable of moving

to some slight extent. A similar form from Hammerfest has been described by K. Bonnevie under the name of *T. obliqua* (Zeitschr. wiss. Zool.; Jahrg. 63; 1898 "Zur Systematik der Hydroiden") and figured amongst the Hydroida of the Norske Nordhavs-Expedition, 1896-8; Christiania, 1899. This new species was founded for a single specimen, which Fröken Bonnevie tells me was a female. G. Swenander has since found similar gonophores produced by colonies, many of the zooids of which bore the normal non-tentaculate gonophores of *T. indivisa* (Det Kongl. Norske Vid. Selsk. Skr. 1903; Trondhjem, 1904; No. 6. "Uber die Athecaten Hydroiden des Drontheimsfjordes"). He therefore regards Bonnevie's species as a variety of *T. indivisa.*

None of the female specimens from this rock at Port St. Mary that I have examined have failed to show the presence of the tentacle on most of the gonophores, though in one case at least it is absent from a few of them; and in addition to this it is unusual for their blastostyles to be long and pendulous as is usual in *T. indivisa.* Pendulous female blastostyles have occasionally been seen, however, and occurred in Bonnevie's original specimen; they are a constant feature of the male hydranth. There are also certain minor differences to be seen between sections of the gonophores of this form and of the normal *T. indivisa.* The female shows a single radial canal instead of four—a feature obviously correlated with the presence of the single large tentacle to the base of which the canal runs, there communicating with the large endodermal cavity of the tentacle; whilst the male shows no radial canals (or tentacles) at all, but does show what the normal *T. indivisa* apparently does not—conspicuous sterile cells in the outer layers of sperm, these cells often bearing delicate processes that pass inwards towards the spadix,

as has been described in male gonophores of *T. hodgsoni* (Hickson and Gravely: Hydroid Zoophytes of the National Antarctic Expedition; Brit. Mus. 1907, p. 14, Pl. iv., fig. 34).

In spite, however, of these well-marked differences of anatomy occurring in the one or two specimens of each sex thus carefully examined (and so probably also in the others), as well as of the presence of the large tentacle on the female gonophores, it seems to me, in view of Swenander's statements, to be better to regard Bonnevie's *T. obliqua*, and so also the Port St. Mary specimens, as a variety of *T. indivisa* at any rate until further information is obtained as to the weight to be given to these characters. It would be at least inconvenient to be unable to determine the species of one sex without the examination of carefully prepared sections.

Obelia longissima, which has up to the present apparently only been recorded from the L.M.B.C. area at Little Ormes Head and Blackpool ("Fauna," Vol. I., p. 102), was found in large quantities by Mr. Dunlop on the lower parts of the lines attached to lobster-pots between Port Erin and Fleshwick Bay. Although the colonies resembled *O. longissima* as defined by Hincks in the great depth of the hydrothecae and the straightness of the stem, they resembled *O. flabellata* in the dentate margins of the hydrothecae and the subverticillate appearance of the colony due to the forking of the branches at their bases. It is interesting in this connection to note that colonies of *O. flabellata* dredged near the Isle of Man in 1885 ("Fauna," Vol. I., p. 103) were in a very similar way intermediate between the species to which they were referred and *O. dichotoma*. *Halecium tenellum*, which I gather from the "Fauna,"

Vol. III., p. 49, has previously only been obtained by dredging, was found in rockpools on Bradda Head.

Polychaeta.

The following new Polychaeta were obtained:—

Syllis sp. (? young *monilaris*, Sav.), among the rocks below the Biological Station.

Pionosyllis lamelligera (de Saint-Joseph), dredged near Bay Fine.

Pionosyllis sp., from the breakwater.

Odontosyllis ctenostoma (Clpd.), and another species of this genus, which I have not been able to identify, were to be found swimming at the surface of the sea outside the bay on very calm evenings.

Autolytus incertus (Mgr.), and four other species of the sexual generation of this genus, were taken in the tow-net at the surface; one (additional ?) species was dredged near Bay Fine, several sexual individuals being attached to the asexual stock in this case; neither of the species of *Autolytus* mentioned in the 1898 list was taken.

Myrianida pinnigera (Mont.)—A fine specimen bearing about a score of sexual (♀) individuals was found under a stone, at extreme low water, on the shore below the harbour-master's house.

Nudibranchiata.

I did not pay much special attention to these, but see that the following which I identified from Alder and Hancock's monograph are not in the British Association list, though I believe that Mr. Chadwick is aware of the presence of all of them at Port Erin:—

Doris pusilla, dredged off Bay Fine.

Doris depressa, Port Erin side of the Calf Sound; identification a little uncertain, as the specimen escaped before reaching the Biological Station.

Doris repanda, Port Erin Bay at low water; differs from Alder and Hancock's description in that it has no conspicuous yellow patches; possibly also the arrangement of the gills is not quite normal.

Eolis despecta, on *Obelia longissima* from lobster-pot lines North of Port Erin Bay.

Echinodermata.

The commonest Ophiopluteus larva found at Port Erin during this period was one not yet identified with its mature form, and so still referred to as *Ophiopluteus mancus* in "Nordisches Plankton."

Plutei of *Ophiothrix fragilis* were rather less common, those of *Ophioglypha albida* still rarer, and those of *Ophioglypha texturata* (= *Ophiura ciliaris*) were very rare.

Echinocardium cordatum; very common.

Echinus esculentus; common.

Echinus miliaris; common.

Echinocyamus pusillus; not common.

Asterid larvae taken were:—

Asterias rubens;

"*Brachiolaria laevis.*"

Holothurian larvae were:—

Synapta digitata.

Enteropneusta.

Tornaria larva of *Balanoglossus* was fairly abundant.

The most striking features of the summer, however, were the extraordinary luxuriance of the Hydroid fauna almost everywhere—*Syncoryne eximia* occurring in such sheets on the breakwater that it seems impossible to believe that it could have been overlooked there before had it been as luxuriant regularly, and the large number and size of the gonophores on *Coryne pusilla* may be noted

as striking examples of this; the unusual abundance of *Tornaria* larvae and of *Haliclystus*—the latter at Fleshwick especially, where it was first discovered this year by Dr. O'Connell; and the change in the character of the bottom off Bay Fine, which perhaps may account for the discovery there of a curious little orange-coloured Coelenterate attached to the concave surface of empty mussel shells, and believed by Dr. O'Connell to be young *Cerianthus*.

The following Hydroids, collected at Hilbre Island on the occasion of the joint Liverpool and Manchester Biological Societies' excursion, on May 29th, 1907, are not recorded from that locality in Miss Thornely's table on pp. 225-228 of the "Fauna," Vol. IV.

Bimeria vestita is to be found on the stems of *Tubularia indivisa*.

Campanularia flexuosa must, I think, have been overlooked in drawing up the list, as it is extremely common under ledges of rock."

Mr. Scott's Report.

Mr. Andrew Scott, A.L.S., has sent me his usual "Faunistic Note" containing additions to our knowledge of the crustacean life of our district, as follows:—

"A few additions to the fauna of the Irish Sea have turned up since the last Annual Report and are recorded below. These all belong to the Crustacea, and are representatives of the Schizopoda, Sympoda or Cumacea, and Copepoda. The worker who studies the Crustacea from that portion of the Irish Sea which has been investigated so long by the Liverpool Marine Biology Committee, appears to have little to hope for in the way of new species or even new records of known species. It is very creditable to those investigators of the past, who, with

limited appliances and often working under most adverse conditions at sea, were able to do so much good work. Any new records that one obtains are due entirely to the more systematic and exhaustive investigations carried on now, which were impossible in the past. A good deal yet remains to be done, however, before the various organisms inhabiting the sea round the Isle of Man are completely known. The deep channel between the Isle of Man and Ireland is still practically virgin ground. The few hauls snatched from it by a stroke of luck have revealed interesting forms. Under the International Investigations, the deep water of the Faröe Channel is now shown to have a rich and varied crustacean life; while we know from the monographs of Professor G. O. Sars and numerous papers by other workers that the deep water of the Norwegian Fjords has a rich fauna. The beautiful copepod *Euchæta barbata*, Brady, described from a single specimen taken off the East coast of S. America during the "Challenger" investigations, is not uncommon in those northern depths. Turning to our own shores we find, from the investigations of Sir John Murray, the Fishery Board for Scotland, the Fisheries Branch of the Department of Agriculture and Technical Instruction for Ireland, &c., that the deep waters of the Scottish lochs, e.g., Loch Fyne, and off the west coast of Ireland have a fauna quite distinct from the shallower regions, at any rate as regards the crustacea. It is rather remarkable that we should know so much concerning the animals inhabiting the deep waters mentioned, and yet know practically nothing about the life in the deep water, of over 50 fathoms, between England and Ireland. This deep area forms a nearly continuous portion of the sea bottom from the Atlantic, North and South of Ireland. A narrow strip of this

channel, measuring nearly 30 miles long by about two miles wide, is over 100 fathoms deep. The greatest depth given on the Admiralty Chart is 149 fathoms, and is traversed by the telegraph cable between Portpatrick and Donaghadee. An investigation of this area beyond the 50 fathom line can only be attempted with a good sea-going vessel, well furnished with scientific apparatus. This has not been available in the past, but would be possible with the aid of an annual grant from the Government, on the lines suggested by Professor Herdman in the Report on the Lancashire Sea-Fisheries Laboratory for 1906.

The additions now recorded were mostly obtained from Professor Herdman's collections of plankton taken off the Isle of Man during the Easter and summer vacations of 1907, from the yacht "Ladybird." Two of them are from collections outside the 50 fathom line.

Erythrops erythrophthalmus (Göes). Three specimens of this schizopod were found in a collection taken with the "shear" net between Calf Island and Port Erin on April 18th, 1907.

Eudorella emarginata (Kroyer). This cumacean, easily recognised by the large semilunar emargination at the anterior edges of the carapace, and the very prominent tooth-like process defining the ventral limit of the emargination, was found in two collections made with the Hensen net on August 24th, 1907. The samples were from the deep area and contained much fine mud.

Microcalanus pusillus, G. O. Sars. Professor Sars describes this little copepod in his great work on the Crustacea of Norway. It is said to be a true deep-water form and only occurred in depths of more than 150 fathoms. The species was not uncommon in hauls made with the Hensen and Nansen nets at depths between 50

fathoms and 60 fathoms, on August 24th, 1907. It is very small, about 0·7 mm. in length, and is easily overlooked.

Ameira intermedia, T. Scott.—Four specimens of this little copepod were found in a Hensen net collection from Wart Bank, on August 29th.

Heteropsyllus curticaudatus, T. Scott.—One or two specimens of this curious form were taken in a Hensen net collection near Piel Gas Buoy in the course of one of the monthly investigations at present being conducted between Piel and Ormes Head (January, 1907).

Chondracanthus zei, De la Roche.—Specimens of this peculiar parasitic copepod have been found on the gills of *Zeus faber* captured from time to time in the trawl of the "John Fell," during the present year. The species is evidently not a common one. On October 8th seven specimens of Dory, captured near Puffin Island, were examined, and only one *C. zei* was found. *Caligus zei* on the other hand was present on the skin of all the fish.

Lernæa lusci, Bassett-Smith.—One specimen on the gills of *Gadus luscus* captured off Morecambe Bay Light-vessel by the fisheries steamer, February, 1907."

Further Notes on Work.

Dr. H. E. Roaf continued, on several occasions during the year, his investigation of the digestive processes of lower animals. Extracts were made from the digestive glands of various Invertebrata, and the action of these extracts in digesting different kinds of food material is now being examined in detail in the physiological laboratory of the University.

Dr. Roaf has also been investigating at Port Erin the bio-chemistry of the hypobranchial gland (or glands) of Mollusca, and has shown that the mantle of the dog-

whelk, *Purpura lapillus*, contains a substance which in its chemical properties and physiological action is allied to the active substance obtained from the supra-renal bodies of Vertebrates. This secretion was at first supposed to be derived from the "purple" gland, but microscopic examination and re-actions seem to show that the active substance is obtained from a glandular tract lying alongside the purple gland (see paper by H. E. Roaf and M. Nierenstein in Proc. Physiol. Soc., June 22nd, 1907, Journ. Physiol., Vol. 36).

Mr. Lomas has commenced a renewed examination of the mineralogical constituents in the samples of bottom-deposits that we bring up in the dredge from different banks, and the results of his work will be given in a future report.

Mr. Douglas Laurie has started an investigation of Dimorphism in male spider-crabs, but this has not yet gone far enough to give any results.

As *Paracyathus pteropus*, which we dredged this summer from the Train bank, 8 miles off Port Erin, is a distinctly rare British coral, it may be useful to print here the following brief description drawn up by Mr. Chadwick from the animal now living in our aquarium:—

Column—cylindrical, not much higher than the corallum.

Disk—flat, or very slightly raised in the centre; no distinct margin.

Tentacles—twenty-eight in number, arranged in two alternating circlets; stem gradually tapering, membranous, translucent, studded with numerous warts (?cnidophores); head sub-globular, opaque.

Mouth—a lengthened and very mobile slit, with crenulate lips.

Colour—column, disk and tentacles transparent white; a broad vandyked band of vivid emerald green surrounding the mouth.

Diameter of corallum—3 mm.

This coral was described by Gosse (Actinol. Brit., p. 321) from a specimen found attached to a shell of Cyprina from the deepest part of the Moray Firth. The soft parts of the animal were unknown to Gosse, so the above description may be useful.

"Granny" Crabs.

The term "Granny" is used by the Port Erin fishermen in connection with certain crabs which they consider to be unhealthy and useless, but which, curiously enough, are not necessarily either old or female. These crabs are caught in considerable abundance during July and August, in the pots set along the northern shore of the Calf Island, but are rarely, if ever, brought home by the men. They are recognised as inedible and unsaleable, and when caught are promptly killed and thrown into the sea. The "granny" crab, which may be of any size above four inches, generally female, is recognised by its worn and dilapidated appearance, the shell being pitted and stained with black, and the great claws corroded and frequently broken. The surface is frequently overgrown with barnacles and other foreign bodies. The men say that if a crab in this condition is eaten the flesh will be found to have a strong bitter taste, and a powerful purgative effect medicinally. No one who knows will willingly taste them, the merchants will not buy them, and the impression amongst the fishermen is that they are diseased and permanently useless and that possibly they may infect others, and consequently the "grannies" are invariably killed on sight.

We feel confident, however, that there is nothing abnormal about these crabs and that they are merely individuals which are approaching the time when in every second year, a crab this size will cast its shell. Mr. Pearson, in his forthcoming memoir on the Crab, will discuss this question and show that this is the most probable conclusion to arrive at. In this case these crabs, if left alive in the sea, would probably cast their shells in the course of a few weeks, and would then become, after passing through a period as "soft" crabs, normal clean-looking, healthy individuals, suitable for the market. The bitterness of the flesh of the "granny" and its medicinal effect still require explanation, and Dr. H. E. Roaf is now investigating these matters as a question of bio-chemistry; but it may be pointed out that the period of preparation for casting the shell is probably one of active change in the metabolism of the body, and may well give rise to changes in the secretions sufficient to account for the observed facts.

If, then, the "grannies" are natural crabs passing through a transitory phase in their life-history it is evident that they should, when captured, be restored to the sea uninjured, and that much damage may be done to the local fisheries by the present practice of destroying such crabs. Every "granny" returned alive to the sea this year may be caught as a healthy crab a size larger next year.

Intensive Study of Port Erin Bay.

This is no new subject, but I desire to attract renewed attention to it in the hope of inducing the co-operation amongst observers which is essential for its successful pursuit.

At the very first meetings of the Committee in 1885 the intensive study of small areas was put forward as one of our aims, and Hilbre Island was then chosen as the locality to be systematically and minutely examined and recorded. Some progress was made, specimens were collected and observations recorded; but in a very few years, for what seemed then to be very good and sufficient reasons, the scene of our work was shifted to Puffin Island, and again after a period of years to Port Erin. In each case, and in each successive year, records were kept and some advance was made; but other objects which seemed at the moment more pressing, if not ultimately more important, such as sea-fisheries investigations, students' classes, and the preparation of L.M.B.C. Memoirs, from time to time intervened. Still the object was always kept in view, and occasional contributions to it were made. In the fourteenth of these Annual Reports (1900) I discussed some aspects of the matter under the headings "Distributional Charts" (p. 23), and "A 'Census' of the Sea," (p. 26). We had then recorded over 2,000 species of marine animals from Port Erin, and in that report six distributional charts were published giving some information as to the occurrence of these animals. This was a beginning of such a detailed biological survey of our district as we have often put before us as one of our primary objects. Much, however, remains to be done, and it is work that ought to be undertaken by many observers, who will divide up the groups and the localities between them. I hope to induce students and others working at the station during the coming year to co-operate with us, and I re-print here the plan of Port Erin Bay (fig. 3), which was drawn up seven years ago, in the expectation that the squares into

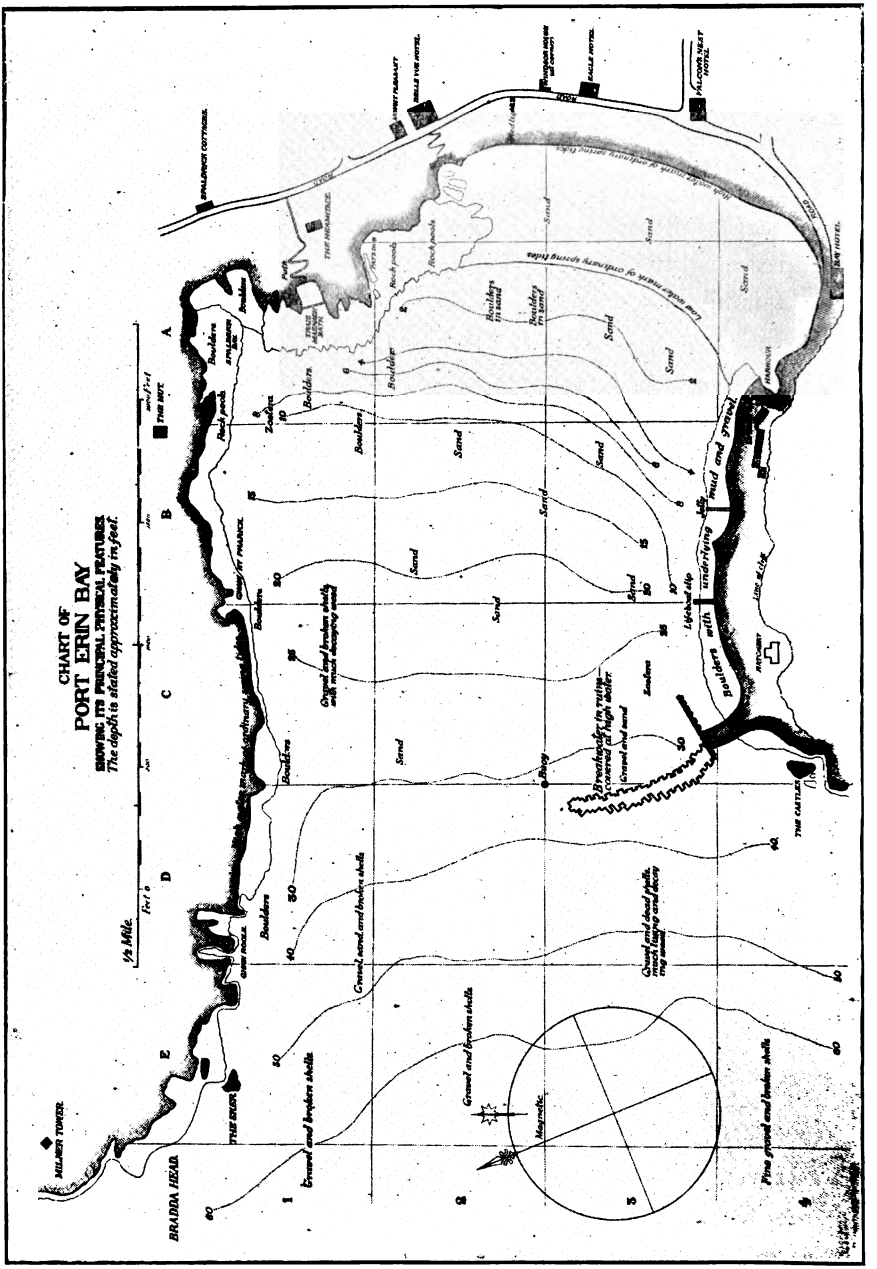

FIG. 3.—Plan of Port Erin Bay.

which the area was then divided may prove useful to observers in fixing localities. The exact distribution of even the commonest species, the relative abundance in different habitats, and at the same place in different years, the presence of varieties in some localities and not in others, and the comparison of large numbers of individuals from exposed and from sheltered, from shallow and from deep, from clear and from turbid waters, are amongst the problems or lines of work included in the intensive study of a small area.

The next two sections of this report, on the Plankton Investigations and on the Comparison of three Fishing Banks off the Isle of Man, are both of them further examples of intensive study of small areas which have been carried on during the last year, and will be continued. But in addition to these, which can only be conducted at sea, from a steamer, I desire especially to direct renewed attention of all workers at Port Erin to the necessity of taking up again with energy, and in co-operation, that systematic survey of the bay which we started in 1900.

Plankton Investigations at Port Erin.

It will be remembered that in last year's Report I published the results of observations made the previous summer off Port Erin, which tended to confirm the belief that the plankton (minute suspended organisms in the sea) has no such regularity and uniformity in distribution as is sometimes supposed. The importance of the matter lies in this—that if there is not this perfect uniformity over wide areas we must not attempt to draw general conclusions from comparatively few and distant observations. We must learn the meaning and relative values of our samples by the intensive study of small

areas, such as the neighbourhood of Port Erin, before embarking on wider oceans.

Convinced of the fundamental importance of such an intensive study, I have spent my three last vacations, the summer of 1906, Easter, 1907, and the summer of 1907 in experimenting day after day with various plankton nets under similar and under varying conditions in a limited sea-area off Port Erin, with results that are startling in their diversity. It was obvious that at all these times the plankton was unequally distributed over the depths, the localities and the dates.

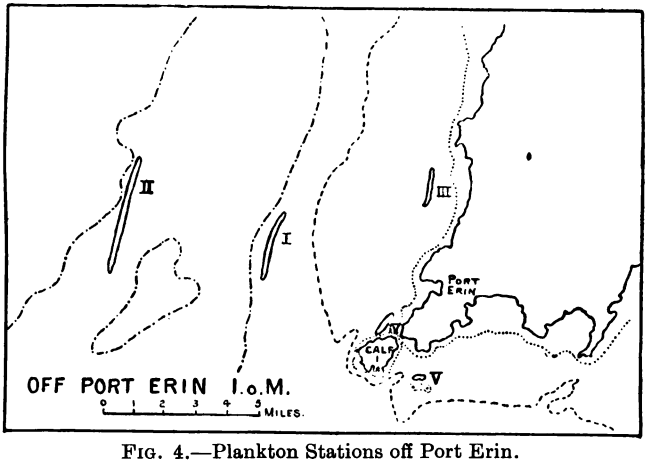

FIG. 4.—Plankton Stations off Port Erin.

The results obtained in the summer of 1906 amounted to 80 gatherings, taken in 40 days, and these were described in our last Annual Report and recorded in more detail by Mr. A. Scott in the Sea-Fisheries Laboratory Report for 1906.

With the view of testing the methods further at another time of year, I devoted a month this spring (March 28th to April 27th) to a systematic exploration,*

* I have used some of these results in a Presidential Address to the Linnean Society on May 25th, 1907, and also laid them in abstract before Section D at the British Association Meeting at Leicester; but I print them here because of their local bearing.

from the s.y. "Ladybird," of the sea immediately around the south-west corner of the Isle of Man. The region in which we worked measured (see map, fig. 4) ten miles from east to west (out to sea) and rather less from north to south (along the coast), but the area investigated was really much more limited than these numbers indicate, since the samples were taken from only two "off-shore" stations, one five

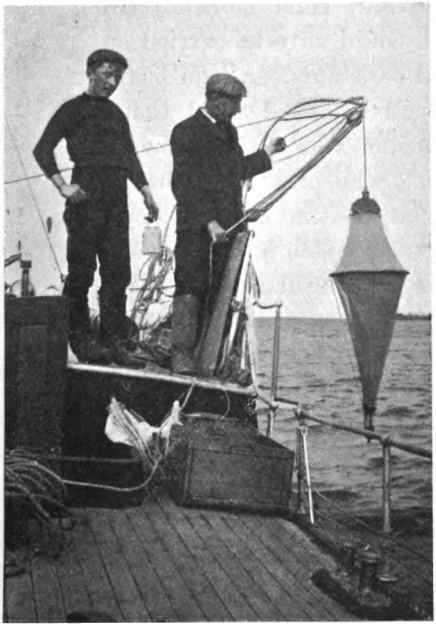

FIG. 5.—Petersen-Hensen net going down open.

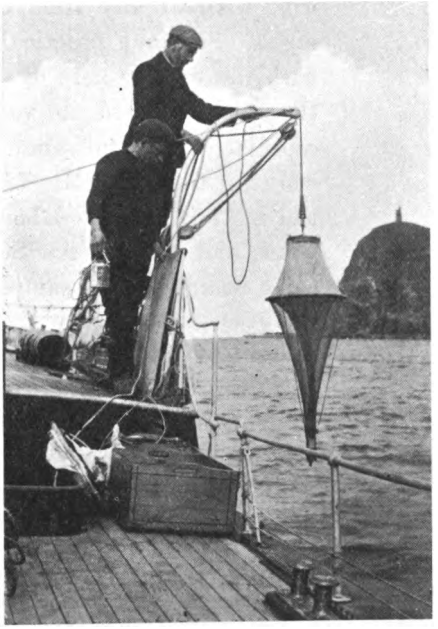

FIG. 6.—Petersen-Hensen net coming up closed.

miles and the other ten miles out from Bradda Head; and from three "alongshore" stations, one to the north towards Niarbyl, one to the south towards the Calf Island, and one in the "southern sea" off Spanish Head —all in water of much the same depth, about 20 fathoms.

Whilst I was taking these samples in the open sea, almost daily, from the yacht, Mr. Douglas Laurie, with a crew of students from the Biological Station, simultaneously took similar samples inside Port Erin Bay in comparatively sheltered water. In 23 working days I find that we took in all 276 samples, an average of 12 per day. It will be readily understood by anyone who has carried on such work continuously, with varied weather, that it was a busy time; and that on some days we were fairly wet, without any time to get cold, from morning till night. So much practical work could only be carried on with the willing help of several assistants. All on board the yacht helped in various ways, but I must thank especially Mr. Buchanan-Wollaston who assisted me in working the nets, Mr. Chadwick who preserved most of the material in the laboratory at the end of each day's work, and Mr. Andrew Scott, A.L.S., who has systematically examined the samples for me. A detailed account of these gatherings will appear elsewhere; I propose at present to discuss only some of the more obvious features of the series—partly from my own records made at the time of collection and partly from Mr. Scott's notes.

At each station, after taking the bearings and the depth, we first lowered two vertical nets (see figs. 5, 6, 7 and 8, from photos taken by Mr. R. Okell), the Petersen-Hensen and the Nansen, to a depth of 20 fathoms, pulled them up slowly through 10 fathoms, and then closed them by "messengers" run down the line. This gave us samples, taken vertically with these two very different nets, of the organisms present in the water between 10 and 20 fathoms. After that three ordinary horizontal open tow-nets exactly alike in all respects (size, shape, mesh, age) were put over—one (A) with a weight attached was allowed to sink to a depth of about 10 fathoms, from

which it gradually rose as the ship went slowly ahead; while the other two (B and C), unweighted, remained continuously at or just under the surface and worked side by side like a pair of sharks or porpoises swimming in our wake. These two last nets ought, if there is any uniformity whatever in the plankton even in the most limited areas, to give similar results, and of course they did so in most cases. My purpose in taking the two similar surface nettings side by side was to show this, and also to test the reliability of the sample; for I would only consider it a trustworthy sample when these two nets agreed in their evidence. Where, under the circumstances stated above, the gatherings differed notably, there must have been some accident in the working of the nets or some abnormality in the distribution of the plankton, such as, no doubt, will sometimes be encountered when traversing the edge of a swarm of gregarious organisms; and it is important to get some evidence as to how frequently such accidents or abnormalities may be met with. For example, on April 2nd, at Station III., I find that the two surface-nets used together gave 17 c.c. and 42·5 c.c. of material respectively; on April 9th, at Station I., 2·5 and 8 c.c. respectively; and on April 24th, at Station II., they gave 7 c.c. and 15 c.c. respectively. On most occasions, of course, they were very similar and on some almost identical in their catch.

The net A (which may be called the weight-net) is of use as having traversed a wider range, 0 to 10 fathoms, so as to sample all the water above the zone traversed by the vertical nets, and it frequently, and in fact usually, obtained a larger gathering and showed a greater variety of organisms than either the deeper, closing (vertical), or the open surface nets.

On some occasions, at the "along-shore" stations (e.g., 2 miles off Bradda Head) hauls were taken with a new "shear-net" made on the principle of the Heligoland "Scherbrutnetz" (*Conseil International—Rapports et Procès-verb.*, vol. ii. p. 62, 1904). This was used as a mid-water net—being lowered to a depth of 5 to 10 fathoms, where, through the action of the shearing plate, placed like a vertical otter-board, it remained even when the ship went ahead at a moderate speed, and so formed

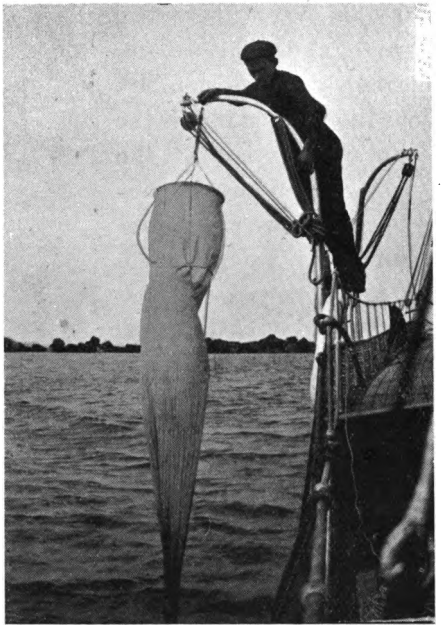

FIG. 7.—Nansen net going down open.

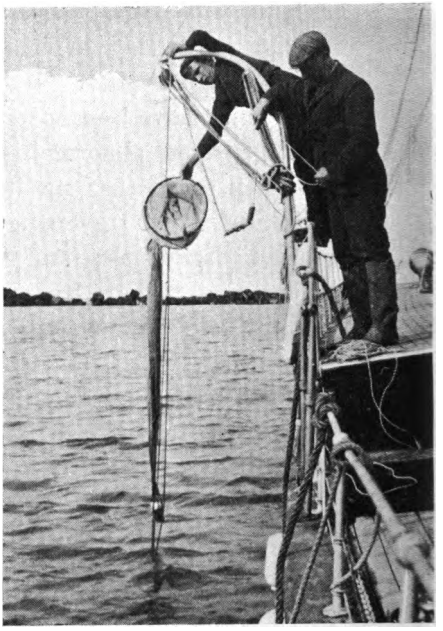

FIG. 8.—Nansen net coming up closed.

a most efficient instrument of capture in waters where the ordinary net cannot be towed. The mouth measured nine feet in circumference, the net was over 10 feet in length, and being formed of rather coarse mesh caught large

quantities of the larger organisms of the plankton such as Sagitta, Medusæ, Ctenophora, Zoëas, the larger Copepoda and some young fishes.

As a vertical closing net I greatly prefer the Nansen (figs. 7 and 8) to the Petersen-Hensen (figs. 5 and 6). It is lighter and less complicated (a matter of some importance in a rough sea), more easily manipulated, less liable to failure in action, costs less and catches more for its size of opening. The brass cylinder at the lower end is, however, too small, and might be improved in other ways.

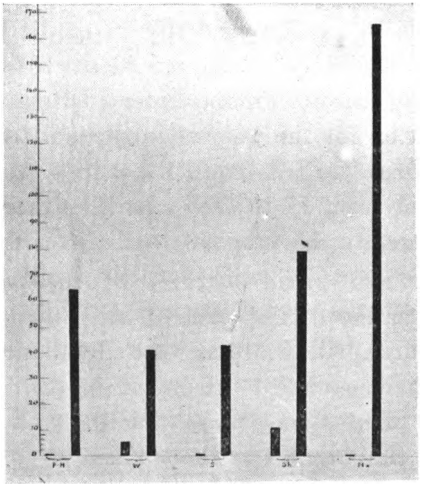

FIG. 9.—Showing by proportional columns the range in quantity taken by the various Plankton nets in April, 1907.

The localities to be sampled, all within a ten-mile radius of Port Erin, were—the two "off-shore" stations, No. I. five miles and No. II. 10 miles from Bradda Head respectively, and three "along-shore" stations, No. III.

towards Niarbyl, No. IV. towards the Calf Island, and No. V. off Spanish Head (fig. 4). The nets to be compared were:—two vertical deep-water, the Nansen and the Petersen-Hensen, and three horizontal, one weighted and the other two surface. In addition a shear-net gathering was taken on occasions from intermediate waters. Each haul of the horizontal nets was a 15 minutes one.

I give here (p. 38), in tabular form, my first statement of results, which may require to be modified in detail or supplemented later on, but which may be taken as substantially correct. Whether one looks at the hauls with the same net at the one locality on different days, or at neighbouring localities on the same day, the want of uniformity both in quantity and in quality is striking. The range for all nets is from 0·5 c.c. to 164 c.c., and the same for the Nansen; for the Petersen-Hensen it is from 0.5 to 64.5 c.c., for the weighted open net from 5.5 to 41 c.c., for the surface nets from 1 c.c. to 42·5 c.c., and for the shear-net from 11 to 78·5 c.c. The diagram (fig. 9) shows graphically the proportions between these hauls.

One or two broad features of the collection are obvious. In the earlier part of the time, up to about the middle of April, Diatoms were abundant, and nearly all the gatherings had a greenish tinge. During that period the plants were more abundant in the bottom waters, and the animals at the surface.

Day after day we found that the two closing vertical nets hauled up from 20 to 10 fathoms were of a brownish-green colour and contained (especially the Nansen) an abundant gathering of Diatoms. The surface nets during this time contained more Copepoda. On April 15th and 19th, however, when the change in plankton was taking place the Diatoms are found to be mainly on the surface and the Copepoda below. As an example of wide distri-

bution I may cite April 10th, when the nets gave consistent results all the afternoon at three localities north of Port Erin, the Diatoms being in all cases more abundant at the bottom and the Copepoda on the surface.

We were fortunate enough on one occasion to obtain incontrovertible evidence of the sharply defined nature of a shoal of organisms, forming an instructive example of how nets hauled under similar circumstances a short distance apart may give very different results. On the evening of April 1st, at the "alongshore" Station III., north of Port Erin, off the "Cronk" one mile out, I took six simultaneous gatherings in both surface and deeper waters. Two of the nets were the exactly similar surface tow-nets which I have called B and C. At half-time, as the result of a sudden thought I hauled in B, emptied the contents into a jar, and promptly put the net out again. This half gathering was of very ordinary character, containing a few Copepoda, some Diatoms and some larvæ, but *no Crab Zoëas*. At the end of the 15 minutes, when all the nets were hauled on board, all the gatherings, including B, showed an extraordinary number of Crab Zoëas rendering the ends of the nets quite dark in colour. B was practically the same as C although B had only been fishing for seven minutes. It was evident that at about half-time the nets had encountered a remarkable swarm of organisms which had multiplied several times the bulk of the catch and had introduced a new animal in enormous numbers. Had it not been for the chance observation of the contents of B at half-time, it would naturally have been supposed that, as all the nets agreed in their evidence, the catches were fair samples of what the water contained over at least the area traversed—whereas we now know that the Zoëas were confined to at most the latter half of the traverse and may

GENERAL RESULTS of the five NETS at five STATIONS in the neighbourhood of PORT ERIN, Easter 1907 (Shear-net omitted). A. Algæ; B N. Balanus Nauplei; C. Copepoda; CN. Copepod Nauplei; D. Diatoms; F.e. Fish eggs; M. Medusæ; N. Nauplei; L. Larval Decapods; O. Oikopleura; BO. Balanus Cypris stage.

DATE.	LOCALITY.	PETERSEN-HENSEN.		NANSEN.		WEIGHT-NET.		TWO SURFACE NETS.	
		C.c.	Chief Organisms.	C.c.	Chief Organisms.	C.c.	Chief Organisms.	C.c.	Chief Organisms.
Mar. 29.	Stat. IV.	.....	.....	.....	.....	.....	.....	8+9	D. C. F.e.
Apr. 1.	Stat. III.	.....	.....	.....	.....	18	D. CN.	8+25	C. A. Z.
1.	Stat. II.	19	D.	.....	.....	16	D. A.	17	D. A.
2.	Stat. III.	23	D.	.....	.....	41	D. N.	17+42·5	C. A. F.e. D.
3.	P. E. Bay	.....	.....	.....	.....	.....	.....	42·5	D. N. C. F.e.
4.	Stat. II.	34·5	D.	.....	.....	6	D. C.	11·5	D. A.
4.	Stat. III.	38·5	D.	26	D.	12·5	A. C. D.	12·5	D.
4.	Stat. III.	64·5	D.	164	D.	5·5	D.	14+1	D. F.e.
5.	Stat. II.	12·5	D.	100	D.	15·5	A. D.	9+12	A. D. C. F.e.
6.	P. E. Bay	.....	.....	.....	.....	.....	.....	12+13·5	D. C.
8.	Stat. I.	6·5	D.	73	D.	21	D.	20+12	D.
8.	Stat. II.	6	D.	49	D.	15	D. C. F.e.	11½	D. C. F.e.
9.	Stat. I.	9	D.	32·5	D.	10·5	D. C. F.e. M.	8+2·5	D. C.
9.	Stat. II.	4	D.	10	D.	8·5	D. C.	9+11·5	D. C. N.
9.	Stat. III.	.....	.....	.....	.....	.....	.....	33	C. F.e.
9.	P. E. Bay	.....	.....	.....	.....	.....	.....	10·5	D. C. N.
10.	Stat. III.	.....	.....	.....	.....	.....	.....	13+20	C. D.
10.	Stat. I.	1	D.	58·5	D.	15	D.	12+18·5	D.
10.	Stat. II.	2·5	D.	9	D. C.	12	C.	7+8·5	C. D. F.e.
10.	Stat. III.	.....	.....	.....	.....	.....	.....	11.5+14·5	C. D.
10.	P. E. Bay	.....	.....	.....	.....	.....	.....	8+14	D. C. N.
11.	Stat. I.	9·5	D.	77	D.	9	C. D.	16·5+10	C. D.
11.	Stat. III.	.....	.....	.....	.....	19·5	D. A. C.	11·5+15	D. C. A.
13.	Stat. III.	2½	D. C. BN.	30½	D. C. BN.	32	D. C. BN.	23·5+16	C. D. BN.
13.	Stat. III.	.....	.....	.....	.....	.....	.....	16+15·5	C. D. BN.
13.	P. E. Bay	.....	.....	.....	.....	.....	.....	26+24	C. D. BN.

Apr. 13.	Stat. III.	4·5	D.	15·5	D.	18·5	C. D.	20·5+24	C. D. BN.
15.	Stat. I.	1	D. C. F.e.	10·5	D.	17·5	C. D.	11+5	A. D. C. N.
15.	Stat. II.	1	D. C.	13	D. C.	15	C. D.	10+10	D. C.
15.	P. E. Bay	.....	.....	.....	.....	.....	.....	21·5+24	C. D.
16.	Stat. I.	1·5	D. C. M.	10·5	D. C. M.	25	C. D.	12·5+6·5	A. D. C. F.e.
16.	Stat. V.	.....	.....	.....	.....	6+10	A. C. D.	3+8+7+5·5	A. C. D.
16.	Stat. IV.	.....	.....	.....	.....	12	A. C. D.	9+9·5	A. C. D.
17.	P. E. Bay	.....	.....	.....	.....	.....	.....	25+26	C. D. BN. O.
18.	Stat. I.	3+1·5	D. C. O.	10	D. C.	15	C. D.	8+13·5	A. C. D. O.
18.	Stat. II.	5·5	D.	9·5	D.	17·5	C. D.	23·5+17·5	A. C. D.
18.	P. E. Bay	.....	.....	.....	.....	.....	.....	17+17	C. D. BN.
19.	Stat. I.	2	D. C.	8	D. C.	29	C. L.	18+18	C. D. O. F.e.
19.	Stat. II.	3·5	D.	7·5	D.	23·5	C. D.	15·5+16	C. D.
19.	P. E. Bay	.....	.....	.....	...	.....	.....	16·5+18·5	C. D. O. F.e.
22.	Stat. I.	1	C.	6	C.	11·5	C.	11+9·5	C. D. F.e.
22.	Stat. IV.	1·5	C.	1	C.	19·5	C.	9·5+9·5	C. L.
22.	P. E. Bay	.....	.....	.....	.....	.....	.....	14+27·5	C. D. F.e.
23.	Stat. III.	.....	.....	.....	.....	.....	.....	12·5+13	C.
23.	Stat. I.	0·5	CN. C. D.	2	CN. C. D.	18	C. N. D.	9+11	CN. C. D.
23.	Stat. IV.	.....	.....	.....	.....	.....	.....	8·5+6·5	C. N.
23.	P.E. Bay	.....	.....	.....	.....	.....	.....	13+16·5	C.
24.	Stat. I.	0·5	C. D. M.	2	C. D. F.e.	16	C. N. F.e. L.	20·5+15·5	C. D. F.e.
24.	Stat. II.	3	D. C.	5·5	D. C.	17·5	C. N. F.e. L.	7+15	C. N. F.e. L.
24.	P. E. Bay	.....	.....	.....	.....	.....	.....	8+10	CN. C. D.
25.	Stat. III.	1·5	CN. C.	2	CN. C. D.	20	CN. C. D.	5·5+4·5	CN. C. D.
25.	Stat. IV.	.....	...	.....	.....	8·5	C. N. S.	3·5+2·5	C. N. D.
25.	Stat. V.	1	CN.	2·5	CN.	9·5	CN. C.	8+7·5	CN. C. D.
25.	Stat. III.	.....	.....	.....	.....	.....	.....	2·5	CN. C.
25.	P. E. Bay	.....	.....	.....	.....	.....	.....	2·5+6	CN. C. D.
26.	Stat. I.	2	D. CN. C.	7+4	D. CN. C.	12·5	CN. C.	6·5+9	CN. C. D.
26.	P. E. Bay	.....	.....	.....	.....	.....	.....	5·5	CN. C. D.
26.	Stat. V.	0·5	CN.	0·5	CN.	8	C. CN.	4+4·5	CN. C.
27.	Stat. V.	3	D. C.	3	D. C.	11·5	D. C.	6+8	D. C. BO.
27.	Stat. V.	2	D. C.	5	D. C.	10	D. C. BO.	3·5+11·5+7·5	D. C. BO.
27.	Stat. V.	4	D. C.	5	D. C.	10·5	D. C.	7+13	D. C. BO.
27.	P. E. Bay	.....	.....	.....	.....	.....	.....	6	D. C. F.e.

have been even more restricted. Under these circumstances, an observation made solely in the water traversed during the first seven minutes would have given a very different result from that actually obtained; or, to put it another way, had two expeditions taken samples that evening at what might well be considered as the same station, but a few hundred yards apart, they might have arrived at very different conclusions as to the constitution of the plankton in that part of the ocean.

We have a good deal of evidence as to the distribution of the organisms in horizontal zones; and, when Diatoms are not present in great quantity, the most prolific zone off Port Erin seems to be from 5 to 10 fathoms below the surface.

As an example of a case where two similar nets hauled side by side gave very nearly the same amount of material, but where the kinds and numbers of organisms present in the catch when examined were found to be very different, I give the following lists of the contents* of the two surface nets after a 15-minutes' haul on April 13th, 1907, at Station III. The one net contained 16 c.c. and the other 15·5 c.c., but these amounts were made up very differently in the two cases. For example, it will be seen that in the net C there were no Balanus Nauplei and no immature Copepoda, while thousands of both were present in B. Then, again, in B there were very few adult *Temora*, while in C practically all the *Temora* were adult. The lists will show other points of difference. I may add that in the haul of the shear-net, taken at the same place and time, there were 1,380 larvæ of *Pectinaria* in tubes, along with 5,400 Balanus Nauplei, and many other organisms.

* Only omitting those organisms where less than ten individuals were obtained.

	Net B = 16 c.cm.	Net C = 15·5 c.m.
Larval Polychaeta	650	0
Balanus Nauplei	3,000	0
,, Cypris stage ...	50	0
Copepoda Nauplei	7,000	2,000
,, juv.	13,000	0
Calanus helgolandicus ...	100	6
Pseudocalanus elongatus ...	850	500
Temora longicornis ...	2,470	4,750
Oithona similis	100	50
Acartia clausi	250	200
Centropages hamatus ...	0	200
Coscinodiscus concinnus ...	8,000	14,000
Biddulphia mobiliensis ...	40,000	70,000
Rhizosolenia semispina ...	1,000	3,000
Lauderia borealis	1,000	0
Thalassiosira nordenskioldii	2,000	7,000
,, subtilis	6,000	0
Chætoceros teres	0	1,000
Peridinium sp.	500	0
Plutei	500	1,000
Oikopleura sp.	2,000	150
Medusoids	50	25
Sagitta bipunctata	0	48
Crab Zoëas	0	10

This shows very clearly that the two gatherings, although alike in quantity, were unlike in quality.

As a sample of the manner in which, as the result of Mr. Scott's work, we are now recording these plankton hauls, I give here the following table dealing with one of the off-shore stations on a forenoon run in the "Ladybird." The shear-net haul was taken on the way in, half-way between the Calf Island and Port Erin.

Net used	I.	II.	Hensen.	Nansen.	Weight.	Shear.
Depth in fathoms	0	0	—	—	—	—
Catch in c.cm.	23·5	17·5	5·5	9·5	17·5	275
Biddulphia mobiliensis	750	2,250	500	250	2,500	1,000
Chætoceros contortum	—	250	36,000	63,000	500	250
,, debile	—	—	—	2,000	—	—
,, decipiens	—	—	2,500	4,000	—	—
,, sociale	—	—	1,500	2,000	—	—
Coscinodiscus concinnus	1,750	2,750	200	250	1,000	200
Ditylium brightwellii	—	—	500	—	—	—
Eucampia zodiacus	—	—	1,000	—	—	—
Lauderia borealis	—	—	5,000	14,000	—	500
Rhizosolenia shrubsolei	250	250	2,000	2,000	500	—
Thalassiosira gravida	—	—	500	1,000	—	—
,, nordenskioldii	2,000	4,500	65,000	134,000	8,500	500
Rhizosolenia stolterfohti	—	—	1,000	2,000	—	—
Leptocylindricus danicus	—	—	4,000	3,000	250	—
Ceratium furca	—	—	1,000	500	—	—
,, fusus	250	250	—	500	1,500	—
,, tripos	500	750	—	—	1,000	—
Peridinium	—	2,250	500	6,000	750	—
Acanthometra	—	—	—	100	50	—
Medusoid gonophores	200	250	10	120	300	1,800
Plutei of Echinoderms	200	200	—	—	—	—
Sagitta bipunctata	12	—	1	6	27	123
Autolytus prolifer	—	—	—	—	—	1
Larval Polychæta	60	50	—	20	20	250
Mitraria '	400	250	—	—	500	—
Crab zoea	20	—	—	—	8	16
Mysis stage of Crangon	2	—	2	10	37	72
First stage Nephrops	—	—	—	4	4	11
Podon intermedium	150	150	—	—	—	—
Evadne nordmanni	100	100	—	—	150	50
Calanus helgolandicus	1,600	600	10	120	1,200	850
Pseudocalanus elongatus	200	150	100	770	1,600	500
Temora longicornis	300	200	30	150	2,300	750
Centropages hamatus	100	100	—	—	—	50
Anomalocera pattersoni	500	400	5	—	—	—
Acartia clausi	2,600	2,400	40	125	1,600	50
Oithona similis	400	300	5	50	150	—
Copepod nauplii	250	4,500	4,000	—	7,000	250
,, Juv.	2,000	3,000	100	18,000	4,000	150
Barnacle nauplii	30	25	10	75	75	650
,, cypris stage	2	—	1	—	—	6
Oikopleura sp.	3,300	2,750	140	500	3,300	750
Fish eggs, Rockling	6	1	—	—	—	9
Common Dragonet	10	2	—	—	4	7
Topknot	1	3	—	—	—	—
Bib	9	8	1	1	2	5
Whiting	13	12	—	—	11	3
Cod	8	1	—	—	—	1
Green Cod	1	3	—	2	2	4
Haddock	1	4	—	—	—	—
Gurnard	—	1	—	—	2	—
Dab	—	5	—	—	—	—
Sprat	—	1	—	—	—	2
Spotted dragonet	—	—	—	—	—	1
Young fishes, Gadoid	—	—	1	1	2	10
,, Clupeoids	—	—	—	—	—	10

During the recent summer vacation (August 9th to September 20th, 1907) with the assistance of Mr. Buchanan-Wollaston and others, I again worked the plankton nets on every possible opportunity from the S.Y. "Ladybird," trying to make a still more intensive study of a limited district. On this occasion over 300 gatherings were taken in 30 days, an average of 10 per day. On one trip (September 20th) 36 gatherings were taken in an afternoon, in a small area of only about two miles extent, as follows:—

LOCALITY A:—6 miles out, W.N.W. of Bradda, over 30 fms.

1. Hensen and Nansen nets let down to 30 fms. and hauled up 10 fms. (30-20).
2. ,, ,, ,, 20 fms. ,, ,, 10 fms. (20-10).
3. ,, ,, ,, 10 fms. ,, ,, 10 fms. (10-0).
4. ,, ,, ,, 30 fms. ,, ,, { open to / surface } (30-0)

Weighted open net (A) and two surface nets (A1 and A2) along with shear net (Sh. 1) at 15-20 fms.

Weighted open net (B) and two surface nets (B1 and B2) along with shear net (Sh. 2) at 7-8 fms.

(These each ¼-hour hauls; the one set taken immediately after the other.)
Mill water bottle at 20 fms., strained at the time.
,, ,, at 20 fms., strained on shore.

LOCALITY B:—8 miles out W.N.W. of Bradda, over 30 fms.

1. Hensen and Nansen nets let down to 30 fms. and hauled up 10 fms. (30-20).
2. ,, ,, ,, 20 fms. ,, ,, 10 fms. (20-10).
3. ,, ,, ,, 10 fms. ,, ,, 10 fms. (10-0)
4. Nansen (alone) ,, ,, 30 fms. ,, ,, to surface (30-0).

Weighted open net (C) and 2 surface nets (C1 and C 2) along with shear net (B1) at 7-8 fms.

Weighted open net (D) and 2 surface nets (D1 and D2) along with shear net (B2) at 15-20 fms.

(These each ¼-hour hauls; the one set taken immediately after the other.)
Mill water bottle at 20 fms., at 10 fms., and at 5 fms.

The object I had in view on most occasions was to sample the various layers of water, as well as to compare neighbouring localities and adjoining dates, and the following diagrammatic statement of certain of the hauls taken on September 12th will illustrate the plan of work adopted to differentiate the zones:—

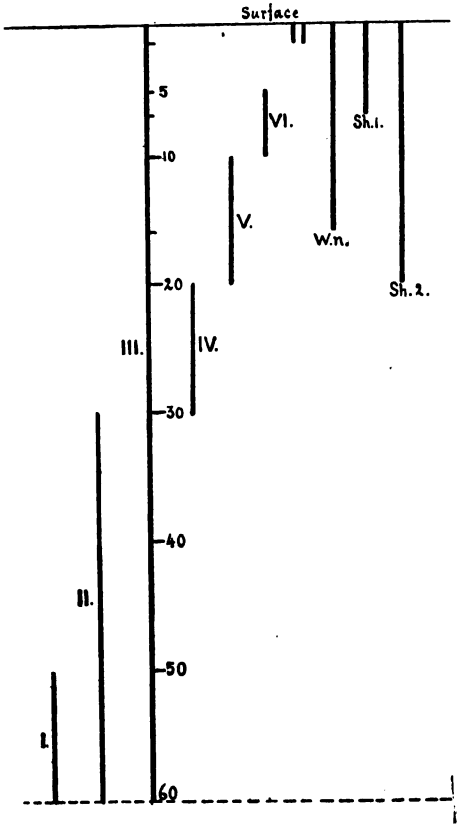

FIG. 10.—Diagram to show the hauls taken at one station.
I.—VI. represent hauls of the vertical closing nets; W.n. (weight net), Sh. 1 and Sh. 2 (shear net) and the two surface nets represent horizontal or oblique hauls.
The numbers 5 to 60 indicate depths in fathoms.

Here, out in the middle of the Channel between Ireland and the Isle of Man, the depth was about 65 fathoms, and we sank our vertical nets down to 60, and hauled them up through the lower 10 fathoms (I.), the lower 30 (II.), and the entire depth (III.), then through the zones 30 to 20 (IV.), 20 to 10, and 10 to 5.

That brought us in touch with the surface zone through which the weight-net, the shear-nets, and the surface-nets had ranged. In this way we hope to be able to localise the constituents of the fauna obtained in a vertical haul such as III.

The full details of the results obtained from these 300 hauls taken in summer, as well as of the 276 taken at Easter and the 80 of the previous summer, will be given in a paper by Mr. Scott and myself, which we hope to have ready for the Annual Report of the Lancashire Sea-Fisheries Laboratory early in 1908; but in the meantime it may be of interest to readers if I give here one more list showing the results of a haul on Station V. inside the Wart bank (see fig. 4). One remarkable feature of this occasion was that the Hensen net hauled up from 14 fathoms contained 150 specimens of what is considered by Mr. Scott to be a new species of *Leptopsyllus*, while the Nansen net used at the same time, and at the same depth, on the other side of the ship, caught twice as much material but not a single specimen of the new Copepod. The surface nets (I. and II.) are also somewhat divergent in their results.

Net used	I.	II.	Hen.	Nan.	Weight.
Depth in fathoms	0	0	—	—	—
Catch in c.cm.	4.5	3	.3	.7	30
Biddulphia mobiliensis	700	750	20	50	1,000
Chætoceros contortum	—	—	15	10	—
,, decipiens	—	—	15	—	—
Coscinodiscus radiatus	—	—	10	—	—
,, concinnus	—	200	—	—	—
Rhizosolenia semispina	250	1,000	25	10	—
Ceratium fusus	—	500	10	10	500
,, tripos	250	2,750	70	20	1,000
Peridinium	250	300	5	—	—
Trochiscia brachiolata	—	200	10	25	250
Sagitta bipunctata	27	21	—	1	125
Tomopteris onisciformis	—	1	—	—	—
Larval Polychæta	200	—	40	—	—
'Mitraria'	75	—	—	—	—
Crab zoea	—	—	—	—	2
,, megalopa	1	—	—	—	—

Mysis stage of Crangon	5	3	—	3	36
Podon intermedium	10	—	—	—	15
Calanus helgolandicus	34	7	—	—	67
Pseudocalanus elongatus ...	4,500	830	100	325	23,000
Temora longicornis	200	25	8	10	700
Centropages hamatus	150	25	5	10	200
Acartia clausi.....	1,255	150	8	100	6,000
Oithona similis	4,500	3,250	35	15	6,500
Paracalanus parvus	200	150	4	6	—
Isias clavipes.....	—	25	—	—	300
Leptopsyllus sp.	—	—	150	—	—
Ameira intermedia	—	—	4	—	—
Zaus goodsiri	—	—	—	—	2
Copepod nauplii	17,000	22,500	340	2,450	38,000
,, Juv.	15,000	750	40	600	19,000
Gasteropods, larval	250	200	20	50	500
Lamellibranchs, larval	250	500	20	50	500
Oikopleura sp.	875	900	25	10	—
Ascidian eggs	1,500	1,500	—	—	2,000
Young fishes	—	—	—	—	6

Comparison of Three Fishing Banks.

In the "Annals and Magazine" for 1839 Professor Edward Forbes published a short paper entitled, "On a shell-bank in the Irish Sea, considered Zoologically and Geologically" (Ann. and Mag. Nat. Hist., Vol. IV., 1840, p. 217), in which he recorded the results obtained during some years of occasional dredging on a scallop bank lying opposite Ballaugh off the North-West of the Isle of Man. As these observations extended over seven years previous to 1839, if we reckon from a period about the middle of his work we may consider that we are now dealing with a record of the condition of the marine fauna on this bank well over 70 years ago. It seemed to me that we had here an opportunity, such as rarely occurs, of determining whether any change had taken place in a limited, well-defined area after a considerable interval of time. Forbes, unfortunately, did not deal with all groups of animals, and in fact he paid most attention to Mollusca, and only recorded in addition the Echinodermata and a few of the

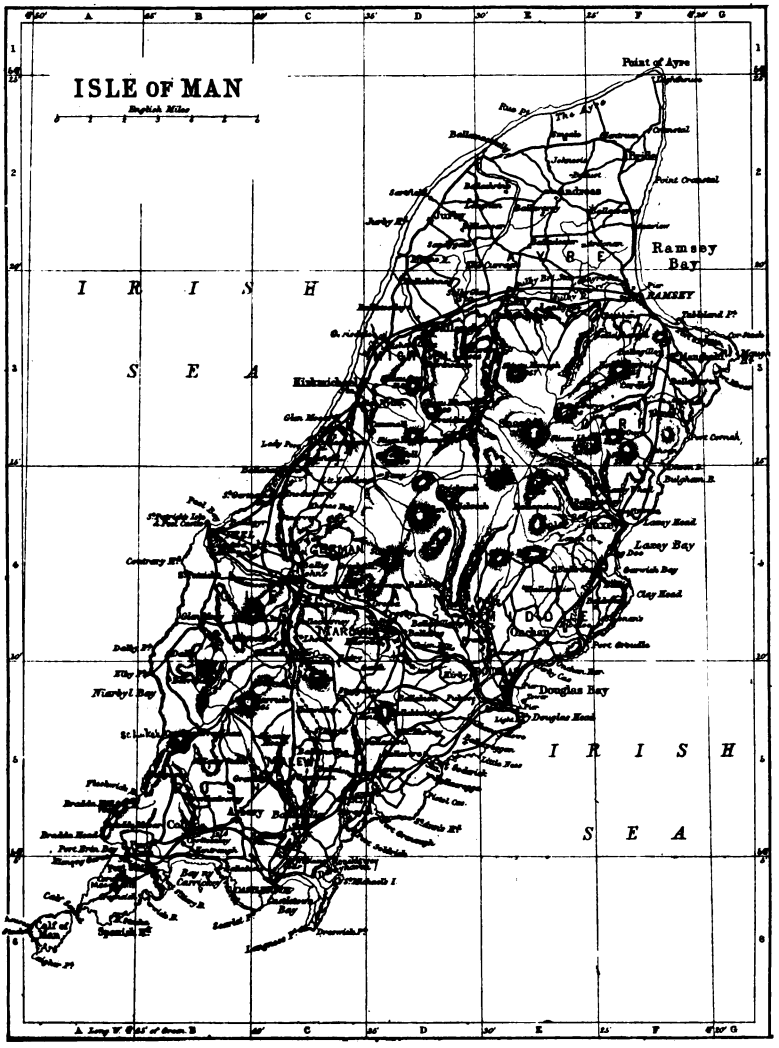

FIG. 11.—Map of the Isle of Man. Ballaugh lies a little inland half-way between Kirkmichael and Jurby Head.

Zoophytes. Still we may be thankful for what he has given us at such an early date, and it will be interesting to see what can be made of it in comparison with our

observations at the present time. He ends his paper with the following paragraph:—

"I have drawn up these observations chiefly in the hope of inducing others to present us with similar reviews of the shell-banks of our coast. Geology and zoology will gain as much by inquiring how our marine animals are associated together as by investigating genera and species, though the former subject has, as yet, been but little attended to in comparison with the latter."

That sentiment is in thorough accord with the views of nature expressed in these L.M.B.C. reports, and it is in the same spirit that we now examine, and hope to add to Forbes' observations of seventy years ago; we are only continuing, and I hope extending, the work that he began so well.

As yet we have had only a few days' work on the Ballaugh bank, and if we have already found more species than Forbes records, that does not necessarily lead us to the conclusion that the fauna is now more abundant, since we have dealt with some groups of animals that were not given in the older list, and possibly our modern methods with a convenient steamer, an Agassiz-trawl and wire-rope enable us to work more rapidly and effectively. But looking merely at the groups recorded by Forbes we find that we have not found quite so many Mollusca, but a great many more Zoophytes and Polyzoa. The bank seems to be particularly rich in Nudibranchiata and in Cœlenterata; in one haul we counted 200 beautiful colonies of *Alcyonium digitatum*, including both white and orange forms.

There is no object in making a detailed comparison or attempting to draw any conclusions until we have done more work on the bank, and accumulated a greater number of records. It occurred to me, however, that it would be interesting to extend the range of the observations by

including two other shell-banks under slightly different conditions, and showing apparently very different bottom-deposits. These are (1) the Train bank, lying about 8 miles N.W. of Port Erin, where there is a good deal of mud mixed with the sand; and (2) the Wart bank, lying 2 miles S. of Spanish Head, near Port St. Mary, and having the bottom formed chiefly of broken shells and other calcareous

FIG. 12.—Showing the Agassiz-trawl being swung in on the derrick.

fragments. These three banks—the Ballaugh, the Train, and the Wart—lying in the "Coralline" zone off the Isle of Man, ought, in the end, to give us interesting information in regard to the common characteristics and the individual features of such fishing banks in our seas.

The work will be gone on with whenever opportunity offers, and we shall hope to return to the subject in a future report.

L.M.B.C. Memoirs.

During this year two important Memoirs have been added to our published series, and two additional ones of still larger size are now nearly completed. No. XIV. on Ligia, the large shore Isopod Crustacean, by Mr. C. Gordon Hewitt was issued in January, and Mr. Chadwick's Memoir on Antedon, the

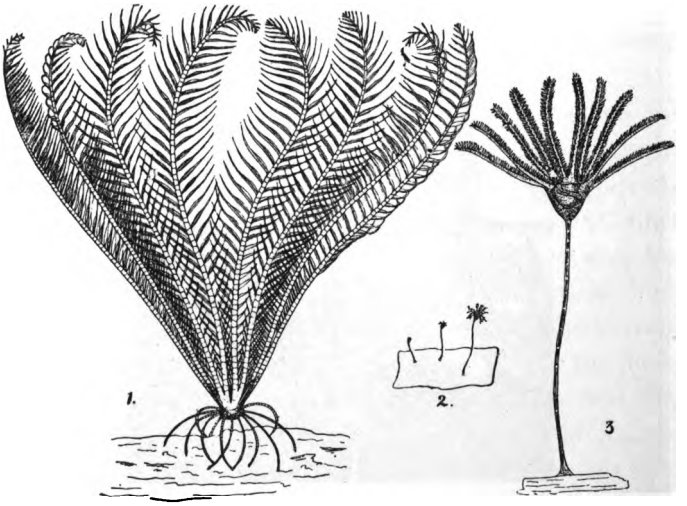

Fig. 13.—*Antedon bifida*, the rosy feather-star:
1. Adult, nat. size; 2. stalked larva, nat. size; 3. larva magnified.

Rosy-Feather-Star (fig. 13), illustrated by seven beautiful plates, appeared in June. Mr. Dakin's Pecten, the Scallop, is now in my hands and will probably be out in December or January; and Mr. Pearson's Cancer (the edible crab) will follow soon after as our seventeenth

Memoir. Still others are in active preparation. We frequently receive, from heads of laboratories, suggestions of types that it would be useful to get undertaken, and, from naturalists, of Memoirs that they are willing to write. As I remarked last year this unusual amount of excellent material which the Committee is happy to be able to issue to the scientific world, is, however, embarrassing from the point of view of expense. Lithographic plates, such as these memoirs require, seem to become more costly, and with the growing elaboration of the subject more detailed illustration is necessary. The Committee are therefore very grateful to those friends who have kindly by special donations enabled the Treasurer to meet the expenses of plates for several of the above-mentioned Memoirs. Further donations towards the illustrations of those still unpublished will be very welcome.

The following shows a list of the Memoirs already published or arranged for:—

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,, XIII. ANURIDA, A. D. Imms, 107 pp., 8 Pls., 4s. 6d.

,, XIV. LIGIA, C. G. Hewitt, 45 pp., 4 Pls., 2s.

,, XV. ANTEDON, H. C. Chadwick, 55 pp., 7 Pls., 2s. 6d.

PECTEN, W. J. Dakin.

CANCER, J. Pearson.

DORIS, Sir Charles Eliot.

OYSTER, W. A. Herdman and J. T. Jenkins.

CUCUMARIA, E. Hindle.

OSTRACOD (CYTHERE), Andrew Scott.

BUCCINUM, W. B. Randles.

BUGULA, Laura R. Thornely.

ZOSTERA, R. J. Harvey Gibson.

HIMANTHALIA, F. J. Lewis.

FUCUS, J. B. Farmer.

BOTRYLLOIDES, W. A. Herdman.

CUTTLE-FISH (ELEDONE), W. E. Hoyle.

ACTINIA, J. A. Clubb.

HALICHONDRIA and SYCON, A Dendy.

HYDROID, E. T. Browne.

PERIDINIAN, C. A. Kofoid.

In addition to these, other Memoirs will be arranged for, on suitable types, such as *Pagurus*, *Sagitta*, *Pontobdella*, a Cestode and a Pycnogonid.

We append to this Report:—

(A) The usual Statement as to the constitution of the L.M.B.C., and the Laboratory Regulations;

(B) The Hon. Treasurer's Report, List of Subscribers, and Balance Sheet.

APPENDIX A.

THE LIVERPOOL MARINE BIOLOGY COMMITTEE (1907).

HIS EXCELLENCY THE RIGHT HON. LORD RAGLAN, Lieut.-Governor of the Isle of Man.
MR. R. D. DARBISHIRE, B.A., F.G.S., Manchester.
PROF. R. J. HARVEY GIBSON, M.A., F.L.S., Liverpool.
MR. W. J. HALLS, Liverpool.
PROF. W. A. HERDMAN, D.Sc., F.R.S., P.L.S., Liverpool, Chairman of the L.M.B.C., and Hon. Director of the Biological Station.
DR. W. E. HOYLE, M.A., University, Manchester.
MR. P. M. C. KERMODE, Ramsey, Isle of Man.
MR. A. LEICESTER, Liverpool.
SIR CHARLES PETRIE, Liverpool.
MR. E. THOMPSON, Liverpool, Hon. Treasurer.
MR. A. O. WALKER, F.L.S., J.P., formerly of Chester.
MR. ARNOLD T. WATSON, F.L.S., Sheffield.

Curator of the Station—MR. H. C. CHADWICK.
Assistant—Mr. T. N. CREGEEN.

CONSTITUTION OF THE L.M.B.C.

(Established March, 1885.)

I.—The OBJECT of the L.M.B.C. is to investigate the Marine Fauna and Flora (and any related subjects such as submarine geology and the physical condition of the water) of Liverpool Bay and the neighbouring parts of the Irish Sea and, if practicable, to establish and maintain a Biological Station on some convenient part of the coast.

II.—The COMMITTEE shall consist of not more than 12 and not less than 10 members, of whom 3 shall form a quorum; and a meeting shall be called at least once a year for the purpose of arranging the Annual Report, passing the Treasurer's accounts, and transacting any other necessary business.

III.—During the year the AFFAIRS of the Committee shall be conducted by an HON. DIRECTOR, who shall be Chairman of the Committee, and an HON. TREASURER, both of whom shall be appointed at the Annual Meeting, and shall be eligible for re-election.

IV.—Any VACANCIES on the Committee, caused by death or resignation, shall be filled by the election at the Annual Meeting, of those who, by their work on the Marine Biology of the district, or by their sympathy with science, seem best fitted to help in advancing the work of the Committee.

V.—The EXPENSES of the investigations, of the publication of results, and of the maintenance of the Biological Station shall be defrayed by the Committee, who, for this purpose, shall ask for subscriptions or donations from the public, and for grants from scientific funds.

VI.—The BIOLOGICAL STATION shall be used primarily for the Exploring work of the Committee, and the SPECIMENS collected shall, so far as is necessary, be placed in the first instance at the disposal of the members of the Committee and other specialists who are reporting upon groups of organisms; work places in the Biological Station may, however, be rented by the week, month, or year to students and others, and duplicate specimens which, in the opinion of the Committee, can be spared may be sold to museums and laboratories.

LIVERPOOL MARINE BIOLOGICAL STATION

AT

PORT ERIN.

Laboratory Regulations.

I.—This Biological Station is under the control of the Liverpool Marine Biological Committee, the executive of which consists of the Hon. Director (Prof. Herdman, F.R.S.) and the Hon. Treasurer (Mr. E. Thompson).

II.—In the absence of the Director, and of all other members of the Committee, the Station is under the temporary control of the Resident Curator (Mr. H. C. Chadwick), who will keep the keys, and will decide, in the event of any difficulty, which places are to be occupied by workers, and how the tanks, boats, collecting apparatus, &c., are to be employed.

III.—The Resident Curator will be ready at all reasonable hours and within reasonable limits to give assistance to workers at the Station, and to do his best to supply them with material for their investigations.

IV.—Visitors will be admitted, on payment of a small specified charge, at fixed hours, to see the Aquarium and Museum adjoining the Station. Occasional public lectures are given in the Institution by members of the Committee.

V.—Those who are entitled to work in the Station, when there is room, and after formal application to the Director, are:—(1) Annual Subscribers of one guinea or upwards to the funds (each guinea subscribed entitling to the use of a work place for three weeks), and (2) others who are not annual subscribers, but who pay the Treasurer 10s. per week for the accommodation and privileges.

Institutions, such as Universities and Museums, may become subscribers in order that a work place may be at the disposal of their students or staff for a certain period annually; a subscription of two guineas will secure a work place for six weeks in the year, a subscription of five guineas for four months, and a subscription of £10 for the whole year.

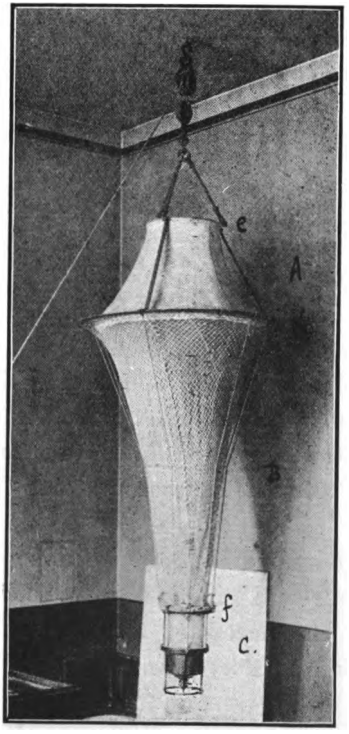
VI.—Each worker is entitled to a work place opposite a window in the Laboratory, and may make use of the microscopes and other apparatus, and of the boats, dredges, tow-nets, &c., so far as is compatible with the claims of other workers, and with the routine work of the Station.

VII.—Each worker will be allowed to use one pint of methylated spirit per week free. Any further amount required must be paid for. All dishes, jars, bottles, tubes, and other glass may be used freely, but must not be taken away from the Laboratory. Workers desirous of making, preserving, or taking away collections of marine animals and plants, can make special arrangements with the Director or Treasurer in regard to bottles and preservatives. Although workers in the Station are free to make their own collections at Port Erin, it must be clearly understood that (as in other Biological Stations) no specimens must be taken for such purposes from the Laboratory stock, nor from the Aquarium tanks, nor from the steam-boat dredging expeditions, as these specimens are the property of the Committee. The specimens in the Laboratory stock are preserved for sale, the animals in the tanks are for the instruction of visitors to the Aquarium, and as all the expenses of steam-boat dredging expeditions are defrayed by the Committee, the specimens obtained on these occasions must be retained by the Committee (*a*) for the use of the specialists working at

the Fauna of Liverpool Bay, (*b*) to replenish the tanks, and (*c*) to add to the stock of duplicate animals for sale from the Laboratory.

VIII.—Each worker at the Station is expected to lay a paper on some of his results—or at least a short report upon his work—before the Biological Society of Liverpool during the current or the following session.

IX.—All subscriptions, payments, and other communications relating to finance, should be sent to the Hon. Treasurer. Applications for permission to work at the Station, or for specimens, or any communications in regard to the scientific work should be made to Professor Herdman, F.R.S., University, Liverpool.



Hensen's Plankton Net.

Appendix B.

HON. TREASURER'S STATEMENT.

The list of Subscribers and Balance Sheet for 1907 is herewith appended. The latter shows a small balance due to the Treasurer, which indicates the necessity there is for additional support, as expenses during the past few years have necessarily increased now that the work of the Port Erin Biological Station has been so materially enlarged.

The L.M.B.C. Memoirs have proved of the greatest service, both to the senior students in University Laboratories and to investigators in Biological Stations. They have been much appreciated by scientific men, both in this country and America, and are very favourably reviewed in *Nature* and other papers. These Memoirs are illustrated by lithographic plates, and are necessarily expensive to produce, and, as they are sold at a very low price, the receipts as yet do not cover the cost of production.

During the past year, Memoirs No. XIV., "Ligia" (a Shore Crustacean), and No. XV., "Antedon" (the Rosy-Feather-Star), were published, and the MSS. for several more are in preparation, two, in fact, being already completed and ready to print.

Welcome donations of £30 from Mrs. Holt and Miss Holt, and £20 from Mr. T. Sutton Timmis, have just been received towards the plates of the forthcoming Memoirs on "Pecten" (the scallop), and "Cancer" (the edible crab).

Further Memoirs will be published as funds permit, and the Treasurer will gladly receive donations for this purpose, or for the necessary working expenses of the Biological Station at Port Erin.

Edwin Thompson,
Hon. Treasurer.

1, Croxteth Grove,
Liverpool, December, 1907.

SUBSCRIBERS.

	£	s.	d.
Beaumont, W. I., Citadel Hill, Plymouth ...	1	1	0
Bickersteth, Dr., 2, Rodney-street...	2	2	0
Briscoe, F. W., Colby, Isle of Man	1	1	0
Brown, Prof. J. Campbell, University, Liverpool..	1	1	0
Browne, Edward T., B.A., 141, Uxbridge-road, Shepherd's Bush, London	1	1	0
Boyce, Sir Rubert, F.R.S., University, Liverpool	1	1	0
Brunner, Mond & Co., Northwich...	1	1	0
Brunner, Sir J. T., Bart., M.P., Liverpool ...	5	0	0
Brunner, J. F. L., M.P., London	2	2	0
Caton, Dr., 78, Rodney-street, Liverpool	1	1	0
Clubb, J. A., Public Museums, Liverpool... ...	0	10	6
Cowley, R. C., Laurel Bank, Garston	0	10	6
Crellin, John C., J.P., Andreas, I. of Man... ...	0	10	6
Crosfield, Harold G., Fulwood-park, Liverpool ...	1	1	0
Dale, Vice-Chancellor, University, Liverpool ...	1	1	0
Davis, Prof. Ainsworth, University College, Aberystwyth	1	1	0
Dixon-Nuttall, F. R., J.P., F.R.M.S., Prescot ...	2	2	0
Eliot, Sir Charles, University, Sheffield	1	1	0
Gair, H. W., Smithdown-road, Wavertree ...	2	2	0
Gaskell, Holbrook, J.P., Woolton Wood	1	1	0
Gossage, the late F. H., Camp Hill, Woolton ...	5	0	0
Halls, W. J., 35, Lord-street, Liverpool	1	1	0
Headley, F. W., Haileybury College, Hertford ...	1	1	0
Herdman, Prof., F.R.S., University, Liverpool ...	2	2	0
Hewitt, David B., J.P., Northwich	1	1	0
Hickson, Prof., F.R.S., University, Manchester ...	1	1	0
Holland, Walter, Carnatic Hall, Mossley Hill ...	2	2	0
Holt, Alfred, Crofton, Aigburth	2	2	0
Holt, Alfred, Junr., Crofton, Aigburth	1	0	0
Forward	£44	1	6

	£	s.	d.
Forward	44	1	6
Holt, Mrs., Sudley, Mossley Hill	2	2	0
Holt, P. H., Croxteth-gate, Sefton-park	1	1	0
Holt, R. D., 54, Ullet-road, Liverpool	2	0	0
Hoyle, Dr. W. E., Museum, Owens College ...	1	1	0
Isle of Man Natural History Society	1	1	0
Jarmay, Gustav, Hartford, Cheshire	1	1	0
Jones, Charles W., J.P., Allerton Beeches ...	1	0	0
Lea, Rev. T. Simcox	1	1	0
Leicester, Alfred, 30, Brunswick-street, Liverpool	1	1	0
Lewis, Dr. W. B., W. Riding Asylum, Wakefield...	1	0	0
Manchester Microscopical Society...	1	1	0
Meade-King, R. R., 4, Oldhall-street	0	10	0
Monks, F. W., Warrington...	2	2	0
Muspratt, E. K., Seaforth Hall	5	0	0
Narramore, W., Cambridge Avenue, Gt. Crosby...	1	1	0
O'Connell, Dr. J. H., Dunloe, Heathfield-road, Liverpool	1	1	0
Okell, R., B.A., F.L.S., Sutton, Douglas, I. of Man	1	1	0
Petrie, Sir Charles, Devonshire-road	1	1	0
Pilkington, J. A., Bank House, Maghull	1	1	0
Quayle, Alfred, 7, Scarisbrick New-road, Southport	1	1	0
Rae, Edward, Courthill, Birkenhead	1	1	0
Rathbone, Mrs. Theo., Backwood, Neston... ...	1	1	0
Rathbone, Miss May, Northumberland-street, London	1	1	0
Rathbone, Mrs., Green Bank, Allerton	2	2	0
Roberts, Mrs. Isaac, Thomery, S. et M., France ...	1	1	0
Robinson, Miss M. E., Holmfield, Aigburth, L'pool	1	0	0
Simpson, J. Hope, Ivy lodge, Aigburth	0	10	6
Smith, A. T., 43, Castle-street	1	1	0
Sorby, Dr. H. C., F.R.S., Broomfield, Sheffield ...	1	1	0
Forward	£81	7	0

	£	s.	d.
Forward... ...	81	7	0
Tate, Sir W. H., Woolton, Liverpool	2	2	0
Thompson & Capper, 4, Lord-street, Liverpool ...	1	1	0
Thornely, Miss, Nunclose, Grassendale	0	10	0
Thornely, Miss L. R. Nunclose, Grassendale ...	2	2	0
Timmis, T. Sutton, Cleveley, Allerton	2	2	0
Toll, J. M., 49, Newsham-drive, Liverpool ...	1	1	0
Walker, Alfred O., Ulcombe Place, Maidstone ...	3	3	0
Walker, Horace, South Lodge, Princes-park	1	1	0
Watson, A. T., Tapton-crescent, Sheffield... ...	1	1	0
Whitley, E., Clovelly, Sefton-park, Liverpool ...	2	2	0
Weiss, Prof. F. E., Owens College, Manchester ...	1	1	0
Wiglesworth, Dr., Rainhill...	1	1	0
Wragg, Sir W., D.C.L., Port St. Mary, Isle of Man	1	1	0
Wright, C. H., 9, Cook-street, Liverpool	1	1	0
	£101	16	0

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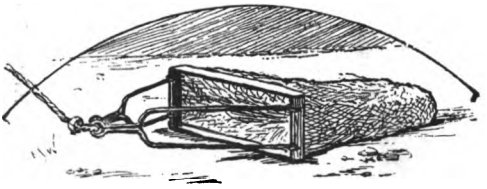
Victoria University, Manchester	£10	0	0
University, Liverpool	10	0	0
University, Birmingham	10	0	0
	£30	0	0



The Naturalist's Dredge.

THE LIVERPOOL MARINE BIOLOGY COMMITTEE.

Dr. IN ACCOUNT WITH EDWIN THOMPSON, HON. TREASURER. **Cr.**

1907.	£	s.	d.
To Balance due Treasurer, December 20th, 1906 ...	1	10	9
,, Printing and Stationery :—			
,, Printing Memoirs	13	15	9
,, Plates for Antedon Memoir.....	31	3	0
,, Printing Report for 1906	16	13	1
,, Illustrations for 1907 Report	2	4	2
,, Boat Hire	2	14	3
,, Books and Apparatus at Port Erin Biological Station	17	0	1
,, Postage, Carriage, &c.	11	8	10
,, Natural History Specimens.....	3	19	9
,, Salary, Curator	75	0	0
,, ,, Assistant.....	27	6	0
,, Sundries	10	0	5
	£212	16	1

EDWIN THOMPSON,
HON. TREASURER.

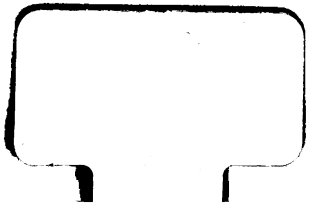
LIVERPOOL, *December 20th, 1907.*

1907.	£	s.	d.
By Subscriptions and Donations received	92	10	0
,, Amount received from Universities for hire of "Work Tables"	30	0	0
,, Dividend, British Workman's Public House Co., Ltd., Shares	4	19	0
,, Sale of Nat. Hist. Specimens	2	2	2
,, Interest on British Association (1896) Fund ...	38	0	0
,, Bank Interest.....	0	15	2
,, Laboratory and Class Fees	3	0	0
,, Sale of Guides, &c.....	12	10	9
,, Sale of Bottles, &c.	1	3	9
,, Admissions to Aquarium	18	9	0
,, Sale of Memoirs.....	8	10	3
,, Balance due to Treasurer	0	16	0
	£212	16	1

Endowment Invested Fund:—
British Workman's Public House Co.'s shares £173 1 0

Memoir Fund—Balance in Bank.....£14 6 0
,, ,, Donation from Mrs. and Miss Holt... 30 0 0
,, ,, ,, ,, T. Sutton Timmis, Esq. 20 0 0
£64 6 0

Audited and found correct,
COOK & LEATHER,
Chartered Accountants.



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